VOLUME 4, NUMBER 9 SEPTEMBER 1955

Battelle Technical Review

IN THIS ISSUE:

Trends in Industrial Research

ADVISOR ON METAL PROBLEMS

H. Maurice Banta

Under today's conditions, industrial research often calls for extensive equipment and a large staff of specialists. Consequently, first costs may appear to be great. One answer, according to H. Maurice Banta of Battelle, often lies in cooperative research. Such cooperation, by a group of sponsoring companies, he suggests, is particularly desirable in those cases where the problem is basic to a whole industry or several industries, where costs are high, and where the likelihood of patents to protect the sponsors is small.

Since his association with Battelle in 1942, Maury has had an opportunity to see the value of cooperative sponsorship of research. As technical advisor to industry, he has been instrumental in helping to form sponsoring groups which have led to valuable research results for the drilling, drilling equipment, and gas-transmission industries.

Beginning his Institute career as a metallurgist, Maury has participated in numerous investigations. These include studies of the weldability of steel for airframes and airplane engine mounts, overcoming the brittle fracture of ship-plate, the investigation of gas-transmission pipeline failures, the development of weldable high-strength steels, and the development of nondestructive tests for drill pipe. One of his important responsibilities has been that of heading up the study which solved problems involved in drill-string failures.

Prior to joining Battelle, and after receiving his B.S. in chemical engineering from Purdue University, Maury served with the Jones and Laughlin Steel Corporation. There, as metallurgist in charge of steel-making research in the Pilot Plant Division, he supervised the building of the then only small (3-ton) gas-fired open-hearth furnace in the industry, as well as a 5-ton Bessemer converter. Among other accomplishments, he developed a deep-drawing steel for automobiles and a manganese-molybdenum armor plate for tanks which included boron as one of its constituents—one of the earliest uses of boron in steel.

With two sons in college and a daughter in high school, Maury finds time to enjoy his ham radio. He is also developing a fine collection of photographs of historic buildings as he travels about the country.

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Abstracts of articles from more than 1200 American and foreign journals in a wide variety of technological fields.

A Significant Year

THE YEAR 1955 MAY WELL be accorded a particularly significant place in history.

On the international scene, Senator Walter F. George in speaking of the recent conference at the Summit said, "History may well prove that it was the real beginning of an end to the cold war between the communists and the free nations of the world". Should future events prove this to be true, 1955 will be a truly important date.

On the domestic scene, the year 1955 brings to the American people the most prosperous period they have ever known. This has been accompanied by an expansive feeling of harmony and good will among all segments of the population. These results have been achieved despite the strenuous efforts of prophets of gloom and professional dissenters who have a vested interest in chaos, confusion, and doubt.

Research has played an important part in this evolution. It has made major contributions to the military power of the Western nations, thus enabling their leaders to negotiate from a position of strength. Of perhaps more importance, research has provided much of the technical know-how which has brought economic recovery to Western Europe and permitted the United States to attain new heights of productivity.

Thus, research has grown out of the laboratory. It is now a technique used by business executives to study, analyze, and improve all phases of industrial activity. It is a tool employed by local governments to solve problems of mass transportation, rezoning, urban development, utility operations, and allied matters. It is a force utilized by nations to develop their resources, improve their economies, and influence their domestic and foreign policies.

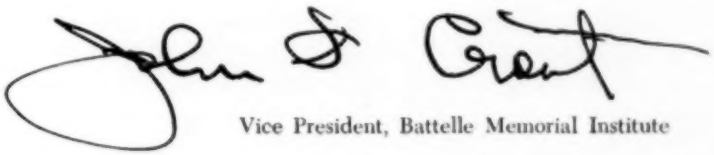
In his recent book, *The Secret of American Prosperity*, Professor William E. Rappard, President of the Institute of Higher International Studies of The University of Geneva, in Switzerland, says that in his opinion, industrial research is one of the four major causes of American economic superiority.

In the United States, the Hoover Commission —advocate of economy in government and the reduction of government activities—reverses its traditional policy to recommend increased expenditures for research by both the military and the civilian branches of government.

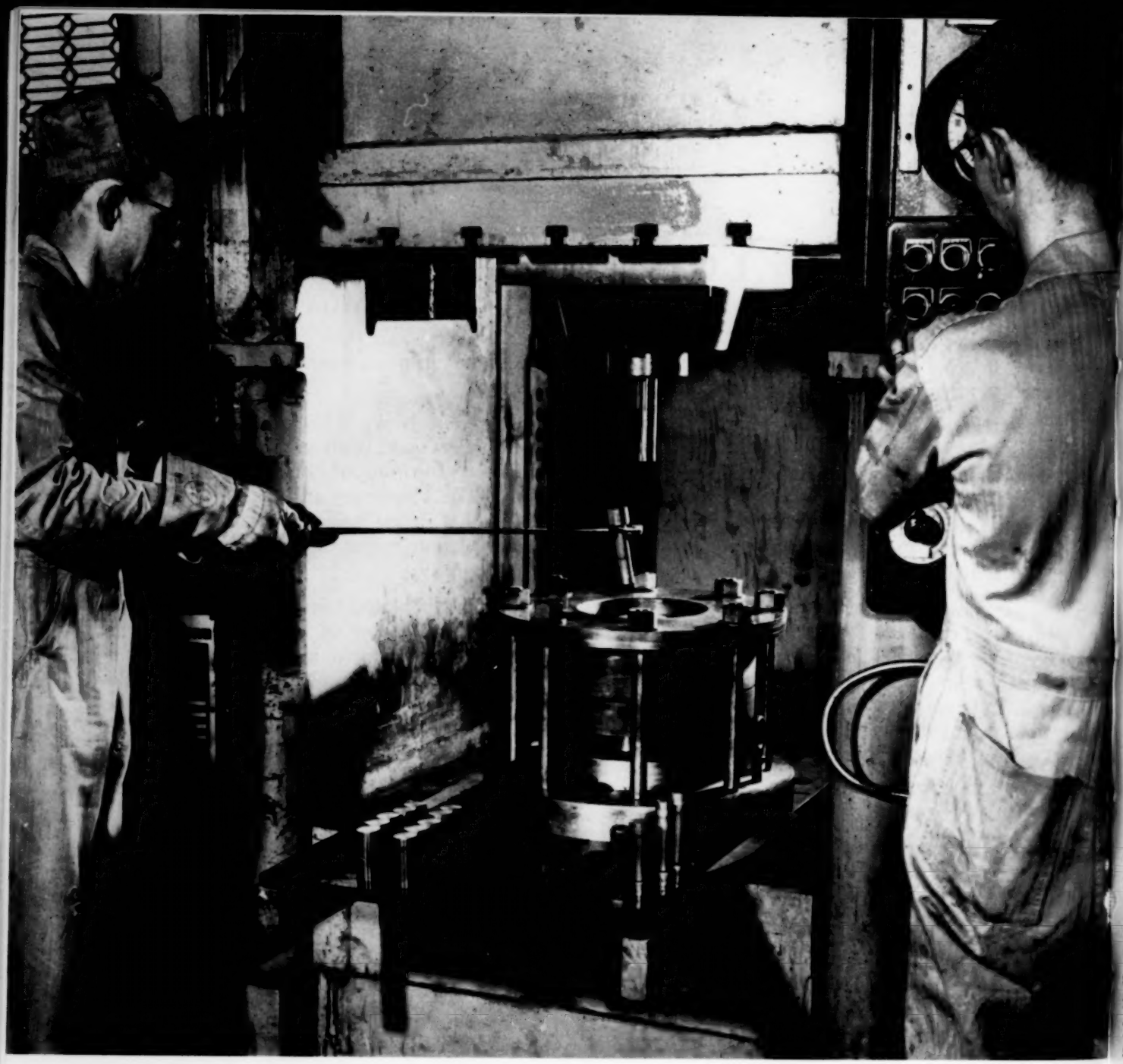
This new recognition of research, this expansion of its fields of study and inquiry, will impose new demands on research organizations.

To meet these demands, Battelle, for example, has reorganized and expanded the scope of work of its Department of Management Services. Men with training in business organization and management, in accounting and corporate finance, in industrial analyses and controls are being brought in to team with engineers, scientists, economic geologists, mathematicians, and economists. From the combined thinking of men with such diverse experience and viewpoints will come ideas, developments, plans, and recommendations particularly fitted to meet the new concepts of research.

Through this innovation in the year 1955, as well as in the construction of its new atomic center, Battelle continues its tradition of leadership and progress in the application of research to the problems of mankind.



Vice President, Battelle Memorial Institute



COLD EXTRUDING TITANIUM

A cold-extruded piece of unalloyed titanium is shown being removed from the die. Smooth, ungalled surfaces were made possible by a special fluoride surface coating that acts as a gliding agent and lubricant retainer. Metallurgists in the light metals division at Battelle have succeeded in producing cold extrusions with reductions up to 70 per cent at pressures similar to those used for steel. They hope that the investigation, sponsored by the Wright Air Development Center, may lead to methods for cold extruding more widely used titanium alloys.

Trends in Industrial Research*

The evidence shows that expanding research activity is strengthening our whole economy by aiding development of new industries and contributing to the growth of established ones. This is the second and concluding part of Dr. Williams' article.

by CLYDE WILLIAMS

IN THE FIRST SECTION OF THIS article we treated the trends in industrial research *per se*—the growth of research, its methods, and industry's increasing dependence on it. We discussed the country's research establishment and the fervor with which industrial research is being pursued. We hinted at the hopefulness with which industry looks to the future for new products to manufacture, opportunities for growth and prosperity, and for the strengthening of our enterprise system. In this section of the article, we shall consider the areas of technology that look especially promising, the trends in the technical side of research. We know that in a few thousand words we cannot cover the subject adequately, but perhaps we can hit enough high spots to give you an appreciation of why industry feels so confident about the future.

Usually, when a newspaper or a magazine writer corners me to talk about things of the future, he likes to frame his questions around such a subject as what scientific developments can we expect 25 or 50 years from now or what will the world be like in the year 2000. He is frequently disappointed when I show reluctance to predict scheduled flights to Mars or to engage in similar fantasy, and instead talk about mundane things such as developments in materials and industrial processes. But I believe that the realistic possibilities for the future are almost as exciting as speculation in the realm of fantasy.

THE PROMISE OF ATOMIC ENERGY

One field that was fantasy a few decades ago is extremely realistic today. That is atomic energy and all it portends. This is a good subject to start with, since it means so much to so many industries.

What are the potentialities for atomic energy? How far has research gone, and what are the promising developments that lie ahead?

You know, of course, the story of the Nautilus. You know that this submarine is the first atomic-powered ship. It is a great success, and the Sea Wolf will be still better. If an atomic submarine can be built, obviously atomic cargo ships are technically feasible and could be built whenever the economics are right. The nuclear-propelled "peace" ship that President Eisenhower has proposed should be a demonstration of the economic possibilities as well as a gesture toward international good will. You have heard about the possibility of atomic-propelled aircraft, and you may have read the recent report that the construction of the first such plane is planned for 1957. Although details about progress in this direction are secret, any intelligent person can see the crux of the problem is building a power plant, with adequate shielding for the crew, and still light enough to be air borne. This may be quite a feat, but offhand it does not seem like a type of problem that would block modern science and technology for long. And it is apparent, also, that only problems of safety and economics stand between us and atomic-driven locomotives.

Thus, we shall dismiss the subject of atomic energy for motive power and get to the subject of nuclear power plants for the generation of electricity. This is a possibility that could have widespread effect on our industrial economy. How close are we to competitive nuclear power?

The nation's first full-scale nuclear power plant is now being built, largely with government funds, at Shippingport, Pennsylvania for operation by the Duquesne Light Company. According to estimates variously reported it will produce power at a cost of somewhere between 11 and 20 mills per kilowatt-hour. The

* Based in part on lectures presented at the Life Officers Investment Seminar, American Life Convention, Beloit, Wisconsin, June 20 and 21, 1955.

Babcock and Wilcox Company, one of the suppliers of equipment for the Shippingport plant, however, has announced that it could *now* build an atomic power plant that would produce electricity at less than 10 mills a kilowatt-hour. And Babcock and Wilcox points out that research and engineering are gradually cutting the construction costs of nuclear power plants. The amortization of such capital costs accounts for 70 per cent of Babcock and Wilcox's calculated electrical energy cost of 10 mills per kilowatt-hour.

If a plant were built that produced electricity at 10 mills, it would be very nearly competitive with present generating plants in certain high-cost areas. About half of the conventional power plants built since the war have calculated power costs of 6 mills. But the cost of electricity from some other postwar plants runs as high as 9 mills per kilowatt-hour, only one mill below the Babcock and Wilcox figure. Just a ten per cent reduction of calculated generating cost would put atomic energy in direct competition with conventional power plants in certain areas. Last February, H. B. Searing, president of the Consolidated Edison Company of New York told the Joint Congressional Committee on Atomic Energy that his company is considering a Babcock and Wilcox nuclear power plant that combines a "demonstrated and conservative technique . . . producing a result we hope will be reasonably competitive with conventional plants in our area". The Consolidated Edison plant will be located at Buchanan, New York, and will be the first privately financed atomic power installation.

I have mentioned only one firm that hopes to get in the nuclear power plant construction business. Many other companies are also doing engineering research on nuclear plants, including the public utilities themselves. Detroit-Edison, for instance, is reported to be working on the design for a $50-million, 100,000 kilowatt plant, and may start construction by the year's end. Also, the Yankee Atomic Electric Company, formed by New England utilities, and working with Monsanto Chemical, hopes to start a 50,000- to 75,000-kilowatt unit. With so much to be learned about the business, and with competition playing its role, we can be almost certain that competitive nuclear power will become a reality.

The question of paramount interest, of course, is "when?" The thinking at the present seems to be around 1962. *Time* magazine, reporting recently on a forecast made by the Atomic Industrial Forum, stated: "The biggest handicap to commercial atomic power is high plant cost . . . Capital investment for large nuclear plants is running around $500 per kilowatt, as

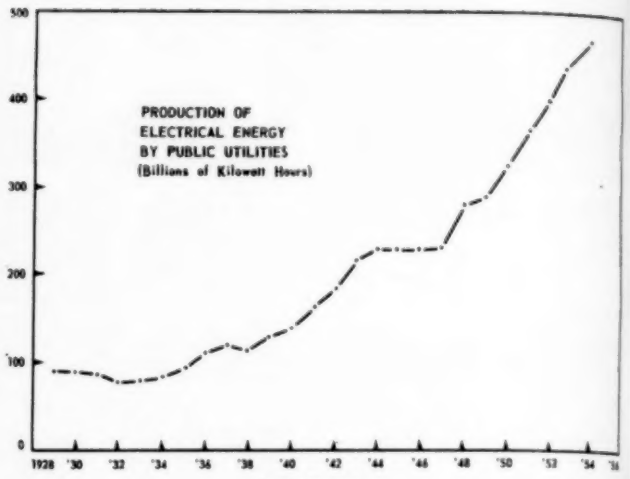


FIGURE 5

compared to $125 for conventional plants . . . But around 1962, the age of cheap atomic power will dawn. Utilities will have learned enough to operate plants efficiently, capital costs will be down to about $180 per kilowatt, and nuclear electricity will become competitive."

Industry's Progress in Atomic Research

You will recall that less than a year has elapsed since Congress passed the revised Atomic Energy Act, giving industry the opportunity to participate in atomic research. Because of the red tape involved, industry's progress in taking advantage of the provisions of the act seems slow, but actually it is proceeding at a fast pace. At the present, much of the private effort is in building the laboratories and pilot plants for atomic research. Once these are in operation, rapid progress may be expected in solving the detailed technical and economic problems that stand between us and competitive nuclear power.

To show you how concrete this effort is, I can cite what we are doing at Battelle.

Battelle has been active in atomic-energy research since 1941—even before the Manhattan or Atomic Bomb Projects. Our first work in this field was with cyclotron-produced isotopes, which we used as radioactive tracers in the study of the wear of automobile engine piston rings. The Institute played, of course, a major role in the development of the atomic bomb, doing research on reactor elements and the materials used in reactors. Direct research for the Atomic Energy Commission has been supplemented by related research for General Electric, Westinghouse, Du Pont, Union Carbide and Carbon, Pratt and Whitney Air-

craft, and other firms. In addition, the Institute conducted nuclear research for other governmental agencies, such as the Air Force and Navy Bureau of Ships, contributing, among other things, to the development of the Nautilus. In doing this work we had built up extensive experience in nuclear technology and invested two million dollars in laboratory facilities for atomic research.

When it became apparent to us that private industry would be permitted to enter the atomic field, we decided that our experience and know-how would be useful and in great demand. Therefore, even before the revised Atomic Energy Act was passed, we took steps to expand our atomic research facilities. We bought 400 acres of land, about 15 miles west of our central laboratories in Columbus, and laid plans for the building of an atomic-energy research center. Construction is now in progress on three atomic research laboratories on the site, and an administration building and a large metallurgical and chemical pilot-plant laboratory have already been completed. Before the end of this year we hope to have atomic studies for private firms under way in the new research center.

One of our new laboratories will be a reactor-development laboratory. It will be equipped for the full-scale mock-up of experimental designs of commercial power reactors. Another laboratory will be a "hot-cell laboratory" for studying the highly radioactive fuels used in atomic power plants. The third laboratory

***DOMESTIC APPLIANCES IN USE**
(January 1, 1955)

Appliance	Number in Use
RADIOS	47,580,000
REFRIGERATORS	41,400,000
IRONS	40,304,000
ELECTRIC CLOCKS	38,485,000
ELECTRIC WASHERS	36,418,000
TOASTERS	32,800,000
TELEVISION SETS	33,200,000
VACUUM CLEANERS	27,865,000
SHAVERS	17,126,000
SANDWICH-WAFFLE COMBINATION	14,789,000
HEATING PADS	14,727,000
MIXERS	15,100,000
RANGES	12,086,000
STEAM IRONS	13,247,000
AUTOMATIC COFFEE MAKERS	12,200,000
PORTABLE HEATERS	11,117,000
WATER HEATERS	6,805,000
FREEZERS	6,750,000
BED COVERINGS	4,978,000
IRONERS	4,144,000

Source: Electrical World, January 24, 1955.
**Battery Operated Appliances Not Included.*

FIGURE 6

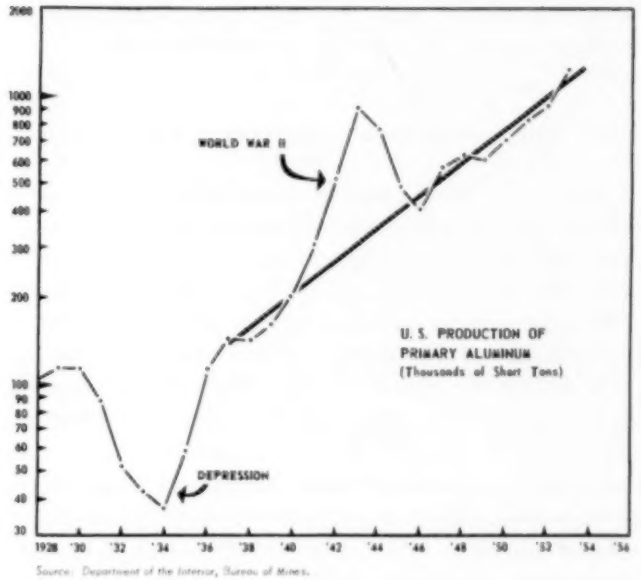

WORLD WAR II
DEPRESSION
U. S. PRODUCTION OF
PRIMARY ALUMINUM
(Thousands of Short Tons)
1928 '30 '32 '34 '36 '38 '40 '42 '44 '46 '48 '50 '52 '54 '56

FIGURE 7

will house what is called a "research reactor" or an actual reactor that operates at 1000 kilowatts. This reactor is being engineered and built for us by the American Machine and Foundry Company, and it is scheduled to "go critical", or start the nuclear reaction, about February 1, 1956. The reactor will be used in a wide variety of research studies, and, of course, will be helpful in studies aimed at the development of nuclear power plants.

This somewhat lengthy account of Battelle's response to the new Atomic Energy Act is meant to demonstrate to you how real and concrete private industry's plans are for the development of atomic power. And Battelle is only one of the research organizations responding to the need for research plants. As I said previously, the necessary research facilities are now being built. From these laboratories, now under construction or being planned, will come the developments that will bring the multiple benefits of atomic energy to our industry and to our people.

Yes, atomic power is on the way, even though some years may elapse before it is proved definitely competitive and attractive from the investment standpoint. Atomic power will supplement conventional power in supplying the American people with the electrical energy they demand. It will help make possible the continuation of the exponential growth of electricity consumption—a doubling every ten years—and it may even accelerate this rate of growth.

But power is not the only peaceful use for atomic energy. The radiations and radioisotopes from the splitting of the atom are other industrial tools of tre-

mendous significance. Numerous laboratories are investigating the commercial possibilities here.

The Possibilities in Radiation Research

One of the most interesting possibilities is the use of atomic radiation to initiate chemical reactions. Radiation can be used to make reactions take place that normally do not occur. This means the possibility of whole new series of chemical compounds. Radiation also can be used to improve present chemical processing, reduce the pressures and temperatures required, and thus possibly reduce production costs. Work has already been done on the use of radiation to produce ethylene glycol from alcohol, to polymerize polyethylene, to halogenate aromatic compounds, to effect hydration reactions, and to cross-link various long-chain molecules.

In food processing and agriculture are numerous applications. It seems quite probable that scientists will devise cheap means to sterilize such things as packaged meats, vegetables, and fruits with atomic radiation. Atomic radiation may eventually be used to pasteurize milk, sterilize drugs and medical supplies, and disinfect grain seeds. As a tool in agricultural, biological, and medical research, it is the outstanding development of the age. A very modest laboratory can afford a radiation source equivalent to millions of dollars worth of radium. For instance, at Battelle we have a cobalt-60 radiation source for use in chemical, agricultural, biological, and metallurgical research that is equivalent in power to at least $100 million worth of radium.

Radioisotopes, of course, give us the powerful radiotracer technique. This means that scientists can follow many chemical and physical phenomena at the atomic level. It is as if the investigator were reduced in size so that he can go along with the "tagged" atom as it goes through complex reactions in biological, chemical, and mechanical systems.

In the materials field, we cannot visualize as yet the extent of possibilities. We know that the properties of metals, plastics, textiles, rubber and leather, ceramics, and electronic components—all can be changed by radiation. New and unusual materials produced by irradiation will lead to new products to manufacture.

Every segment of industry will be affected in some way or other by research on atomic radiation. Applications to machinery, instrument manufacture, and production control have already been made or are under study. Opening up as a broad new area in biological science is the designed evolution of plants through the creation of mutants. Man has acquired through the splitting of the atom a new power that enables him to create not only new physical things but also new life forms.

But so much for the atom. Let us proceed to other research developments that will affect our industrial future

V. Automation and Its Meaning to the Economy

Automation stands out prominently. So much has been written on this subject that no definition is necessary.

I like to look upon automation as a new phase of the Industrial Revolution—a phase in which machinery will be used to relieve men of mental tasks. This is possible because our laboratories have developed a veritable science of electronic control, one which works on the same "feedback" principle as that of the human nervous system. Computers and other electronic devices that use the feedback principle are truly substitutes for "brains", just as older tools and machinery were substitutes for muscle.

We need no longer talk of automation as something around the corner in our industrial economy. It is already here. Automation is widely used in ordnance; in the production of electrical components, radio and television sets, and automotive and aircraft parts; and in food and chemical processing. It is also being applied to office procedures and to merchandising.

Automation Magazine estimates that, in the next ten years, the metal-working industry, alone, will be purchasing automatic equipment, devices, and controls at the rate of a billion dollars per year. In the whole area of automation—from data-handling equipment to automatic processing, manufacturing, and warehousing equipment—annual sales will be close to $10 billion within the next ten years. It is obvious, as automation cuts costs in one plant or office, others in the same business will be forced into it. A snowballing effect could thus result, with a more rapid replacement of capital plant than anyone anticipates at the moment. This, of course, would stimulate all business and bring prodigious demands for investment capital.

One of the most interesting aspects of automation from the standpoint of investment people is the increased emphasis it places on capital. It will certainly extend and prolong the general upward curve in the investment in capital per worker that began with the Industrial Revolution.

Before machine power was applied to productive processes, the capital required per worker was nominal —hardly more than that required for a few hand tools. As mechanization took place, however, capital requirements rose rapidly. By 1939, the average investment in plant, machinery, and tools per productive worker in the United States was approximately $6000. With the emphasis on technology beginning in about 1945, capital needs per worker began to rise rapidly. Last year the investment per worker was around $13,500. Dollar inflation has, of course, accounted for part of this increase, so that an actual doubling in the amount of equipment per worker in the 15 years from 1939 to 1954 is improbable. But the growth has been faster than in any previous period of history. If this growth should continue to increase at the 1945-54 rate during the next 10 years, the investment per worker could reach $23,500 by 1965. Automation—other things being equal—almost assures such a growth in capital requirements.

It is interesting to speculate on just how great the effect of automation might eventually be on the demand for capital. Perhaps we can get an inkling as to future capital requirements per worker by looking at the figure for an industry that is already almost completely automatized. Electric power generation is such an industry. The present investment per employee in electric power production is in excess of $106,000—or 8 times the average for all industry. This figure is not

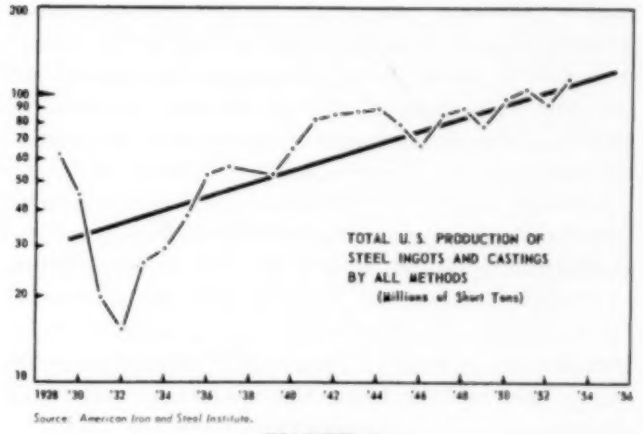


FIGURE 8

necessarily indicative of what capital requirements per worker might be in other automatized industries. It may be low. Electricity "flows" and is thus easily subjected to automatic procedures. Completely automatic factories for the production of, say automobiles, refrigerators, or even bathtubs, would be much more complex than power-generating stations. Capital requirements would necessarily be much greater.

I do not believe that I need to go into the question of the sociological implications of automation. To be sure, automatic equipment will replace workers who are doing routine, uninspiring tasks. It will inevitably cause temporary dislocations in employment. But the workers replaced will be shifted to better, more skilled and highly paid jobs in the production and servicing of automatic equipment, in the merchandising of the increased volume of goods, and the management of productive processes. Just as the older phase of the Industrial Revolution made everyone more prosperous, so will this new phase.

VI. Electricity and the Future

Closely allied to both atomic energy and automation is the general subject of electrification. A further increase in the use of electric power is assured because of these two developments and because of advances being made in many other areas of technology —all of which are making electricity more versatile in its service to man. We can be certain of the economic feasibility of a greatly expanded electric power industry, not only because of our faith in competitive atomic power, but also because of our abundant supplies of coal. Known reserves of minable coal are great enough to guarantee all foreseeable electric power needs far into the future.

We shall wish to mention some of the technical advances that presage further increase in electrical energy consumption, but first let's look at the way the electric utility industry has been growing and some of the things that have been responsible for its growth.

The electric utility industry was created, of course, to supply electric lighting, and lighting continues to be a major component of utility load. Electric illumination came into use shortly after the turn of the century,

and in 1902 was responsible for the consumption of about 2.5 billion kilowatt hours of energy. Stationary and motive power, heating, and communication uses for electricity quickly followed. By the late twenties the radio was well established as the first major electronic development consuming electricity.

In 1929, when research was an activity accounting for the expenditure of 160 million dollars per year, public utility electric generation had reached a rate of 92 billion kilowatt hours per year. As technology advanced, and more and more electric equipment was installed in industry, commercial institutions, the home, and on the farm, electric consumption rose rapidly, doubling approximately every ten years. As shown in Figure 5 in 1940, 142 billion kilowatt hours were generated by utility companies; in 1950, 329 billion; in 1953, 442 billion; and the estimated figure for last year was 472 billion kilowatt hours.

This tremendous growth of the electric power industry, of course, has spurred activity in other industries. Great amounts of copper and aluminum have been required for conductors and transmission lines. Glass and other ceramic materials have been needed for insulators. To build generating and transmission equipment, great quantities of steel have been used. Then, additional markets for metals, ceramics, plastics, wood, and other materials have been created by the development of equipment to consume electricity. Technological advances in the materials and manufacturing industries have made possible the growth of the electrical power industry, and in turn, the former have benefitted from advances made in electric

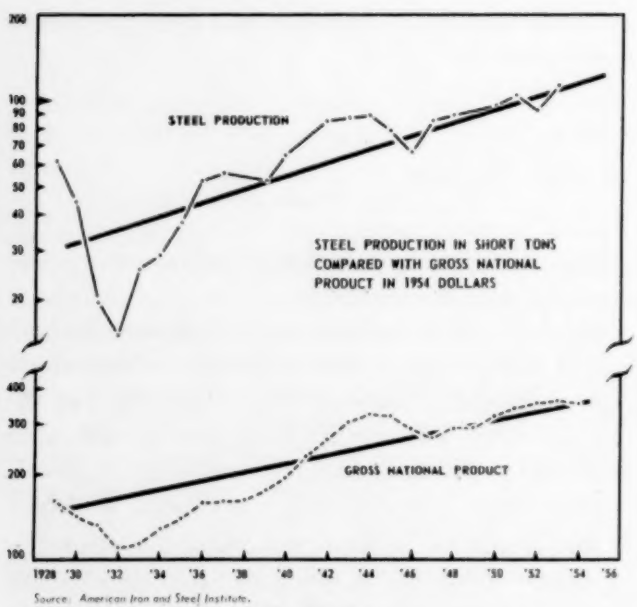

STEEL PRODUCTION
STEEL PRODUCTION IN SHORT TONS COMPARED WITH GROSS NATIONAL PRODUCT IN 1954 DOLLARS
GROSS NATIONAL PRODUCT
1928 '30 '32 '34 '36 '38 '40 '42 '44 '46 '48 '50 '52 '54 '56
Source: American Iron and Steel Institute.

FIGURE 9

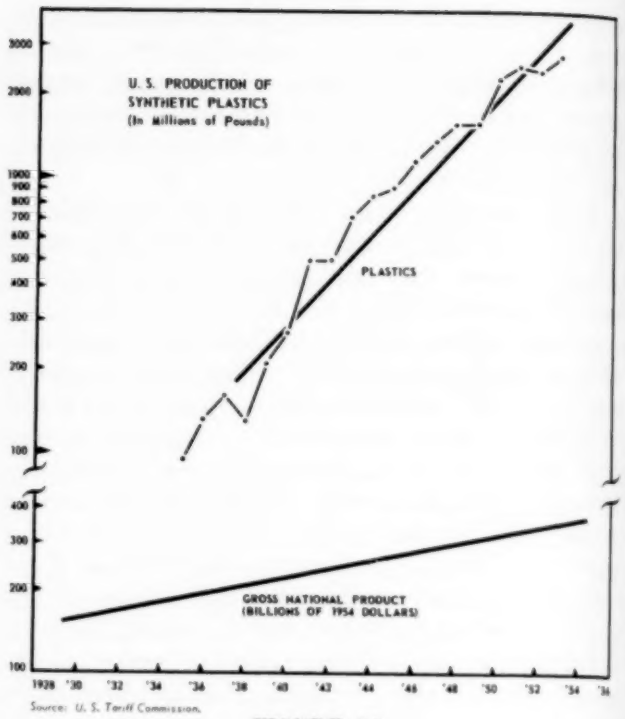

U. S. PRODUCTION OF SYNTHETIC PLASTICS (In Millions of Pounds)
PLASTICS
GROSS NATIONAL PRODUCT (BILLIONS OF 1954 DOLLARS)
1928 '30 '32 '34 '36 '38 '40 '42 '44 '46 '48 '50 '52 '54 '56
Source: U. S. Tariff Commission.

FIGURE 10

power generation. Every step in this circle has been dependent on research and technology.

We can see the effects of technology on electric demand by noting what utilization is made of the energy now being produced. In 1952, 49.5 per cent of the electricity generated was accounted for by industrial sales, 18.0 per cent by commercial sales, and 25.3 per cent by residential sales. The remainder was used by the electric power industry itself or produced to compensate for system losses.

The largest industrial users are the chemical industries, the iron and steel industries, and the nonferrous metallurgical industries, in that order. These industries using the most electricity are, of course, all based on technology. Other industries making heavy use of electricity are: pulp and paper; mining, drilling, and quarrying; machinery; textiles and apparel; food and alcoholic beverages; stone, clay, and glass; and transportation equipment.

Commercial sales of electricity, as distinguished from industrial sales, are based primarily on uses for lighting and in the operation of small motors and communication and heating equipment. Many of the developments responsible for increased use of electricity in business offices are comparable or parallel to developments responsible for increased use in the home.

Since 1940, there has been a phenomenal increase in the number of home appliances, and, as a result, American homes alone now consume as much elec-

tricity as was produced for all purposes before 1940. Thus, these appliances are of tremendous economic significance, not only because of the industries developed to build and service them, but also because of the continuing demand they create for electric power.

Figure 6 will give you an appreciation of how many of the most popular electrical appliances are used in the home. Note that this list does not include air-conditioning equipment, dehumidifiers, clothes driers, dish washers, record players, and many other electric appliances that are becoming commonplace.

This chart illustrates, I believe, another very interesting fact. When a new appliance of great utility, such as the radio, refrigerator, or electric iron, is developed, it enjoys, for a while, a rapidly expanding market. Finally, it saturates that market and the growth in sales from then on levels off to a rate consistent with the rate of growth of population, or more accurately, gross national product. This general principle applies unless some radical innovation is made in the appliance. If, through research, such an innovation is accomplished, a new wave of buying is initiated. The electric iron demonstrates this principle perfectly. With more than 40 million irons of the regular type in use now, that market is nearly saturated. But coming into the picture as a household necessity is the steam iron. You will note that it is farther down the list, but far from the point of market saturation. Each innovation that causes people to acquire additional appliances adds to electric energy demand.

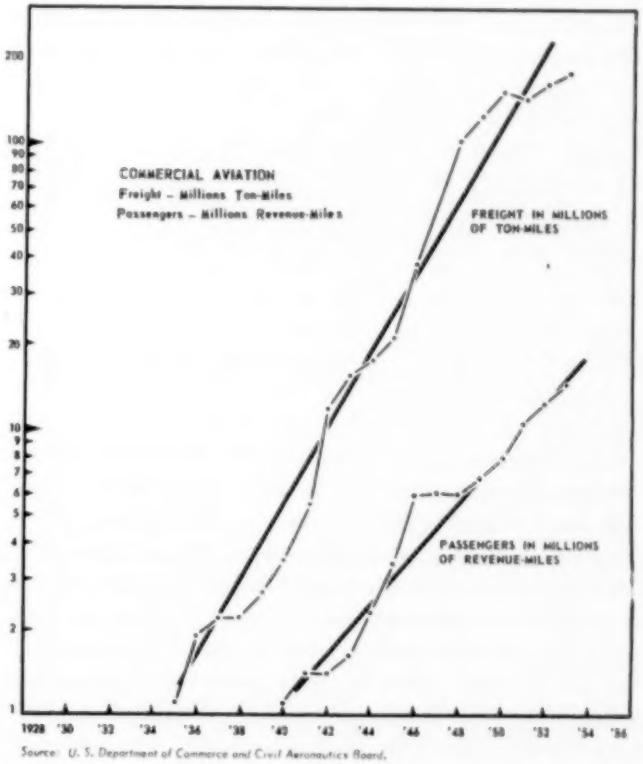
Bases for Future Growth of Electric Power

What, you may ask, are the new technical developments that will be the bases for the future growth of the electric power industry?

Aside from automation, which should require tremendous quantities of electrical energy to operate controls, move materials, power machines, et cetera, new methods for metallurgical and chemical processing promise some of the biggest additional markets for electric power. As the less common or "unused" metals, such as titanium and zirconium, are developed for commercial use, they will be dependent upon electroprocesses and high energies for their production. These less common metals are found in nature locked up tightly in chemical combination with oxygen, sulfur, silicon, and other elements. The stronger the chemical bond, the more energy is required to break it. One of the main reasons that the unused metals have not been put to work is the fact that high-intensity energy is needed to free the metal. New electroprocessess—and chemical reducing methods, themselves dependent upon strong reducing agents produced by electroprocesses—make possible the separation of the pure metal. Special properties of these unused metals make their recovery economically feasible.

Titanium illustrates this point well. In one process for the preparation of titanium, the tetrachloride of the metal is reduced with magnesium. Large quantities of electricity are used, of course, in the preparation of magnesium. In the process, liquid titanium tetrachloride is fed into an iron reaction vessel containing molten magnesium. The heat for melting may be furnished by electricity. After the reaction has taken place, the iron vessel is cooled and the solidified product is machined from the vessel—again with electrical energy. Machining is done in a dehumidified room—probably dehumidified with an electrically driven condenser and fan. The metal thus made is then purified by heating to volatilize residual magnesium and chlorides—another probable use of electricity. Finally, the pure sponge titanium is consolidated by arc melting or induction melting—still another use of electricity.

So it goes with titanium—and many of the other so-called "new" metals. Electric consumption for their preparation is much greater than with the common



Source: U. S. Department of Commerce and Civil Aeronautics Board.

FIGURE 11

nonferrous metals. It is calculated that a one-pound titanium ingot produced by the magnesium reduction process will require from 16 to 22 kilowatt hours of electricity. One pound of magnesium requires 12 kilowatt hours, and one pound of aluminum 11 kilowatt hours. If titanium should become a commercial metal like magnesium or aluminum, the effects on the electric power industry are obvious.

Jet and rocket aircraft, high-pressure and high-temperature chemical processing, and other developments are bringing increasing need for alloys that can withstand extremely high temperatures. The alloys must be made in electric furnaces, and electric methods are required for their melting, working, joining, and fabrication. Then, it seems probable that the electric furnace will become competitive with nonelectric methods for the melting of plain carbon steel. In 1953, some 8.2 million tons of steel were melted electrically, and merely an extension of present trends suggests that 20 to 25 million tons may be melted in the electric furnace annually by 1965.

Many of the new chemical products, so important to our industrial economy are based upon electric energy at some point in their manufacture. Higher alcohols, used in synthetic detergents, are dependent on sodium metal, which is produced electrolytically. Thus, more electrical energy is used in making detergents than soap. Elemental chlorine and phosphorus are becoming very important as reactive and intermediate agents in the manufacture of such chemical products as insecticides and plastics. Both chlorine and phosphorus are produced electrically.

Agriculture's new dependence upon chemical fertilizers means a dependence upon electricity. Nitrogen is fixed electrically, and potassium salts and phosphoric acid require electric power for their manufacture. As crop yields per acre are raised through intensified fertilization, pest control, and irrigation to meet the food needs of a mounting population, the demand for electric power will increase.

The farm, itself, should become a big market for electricity. Even though 93 per cent of the nation's farms are now wired for electrical current, as compared with 35 per cent about 15 years ago, and even though farm use of electricity has increased fivefold in the past decade, the American farm is still not electrified. As the *Wall Street Journal* pointed out recently, most of the electricity used on the farm—80 per cent at least—is used in the house, not in production. Yet there are great opportunities for applying power to farming processes, such as grain preparation and storage, livestock feeding, materials handling, et cetera. The General Electric Company has referred to the farm as a "virtually untapped market" and has estimated that farm use of electricity will rise to 70 billion kilowatt hours in 1970 from 15 billion in 1950. New electric machinery for barn and barnyard chores will be responsible for much of this increase.

We could go on for pages discussing developments that should mean increased uses for electricity. The research now in progress on semiconductors is extremely interesting, and the new transistors, resistors, detectors, and other electronic components that are being produced presage new advances in electronics. There will certainly be a continuation in the development of electric appliances for the home. The extension of electric heating seems very probable, perhaps in conjunction with heat pumps for extracting heat from the earth, or in conjunction with solar energy devices. Electronic refrigeration and air conditioning are theoretical possibilities. But, let's move on to other subjects that will affect the future of our economy.

VII. Unexplored Frontiers in Chemistry and Metallurgy

Our chemical industry is well developed and is very important to our economic welfare. It is now responsible for the production of nearly $20 billion worth of goods per year. But only when you analyze how far theoretical and laboratory chemistry have gone in relation to commercial application do you see how great the opportunities are for chemical progress.

The chemical industry today manufactures for sale some 7000 chemical products. Five thousand of these are organic chemicals. Yet, known and described in the literature are some 500,000 organic compounds, and it is estimated that we are adding 10,000 new ones to this list each year. In other words, we have not yet found uses for 99 per cent of the organic chemicals we know about, and each year the percentage of unused organic compounds increases. Add to this the mounting list of inorganic compounds, and you will see that we have hardly scratched the surface in putting chemicals to work.

Perhaps there will never be need for many of these chemicals not now manufactured, but experience has shown that as time goes on unused chemicals fre-

quently become the bases for thriving new businesses. Ethylene glycol was once a useless waste product. Now it is a very important, premium-priced engine coolant and antifreezing agent for automobiles and aircraft. Glyoxal dialdehyde was a laboratory curiosity for 80 years. Now it is used in the manufacture of at least 30 different products ranging from vitamins to mirrors and paper towelling. The chemical series from which 2,4-D was derived were once just interesting notations in the organic chemist's notebook. Now 2,4-D is one of the most important chemicals in agriculture, having virtually revolutionized the cultivation of corn, our most important feed grain. Most detergents and plastics, now the bases for gigantic industries, were on the unused list of organic chemicals, or the list of theoretical possibilities, only 20 years ago.

Who knows but what many of the half-million or so chemical compounds we have still to explore will be the bases for huge new chemical enterprises 20 years from now?

In the metals field, the story is similar. Of some 80 metallic elements, less than thirty have been developed to economic significance as metals or as alloying agents, and the splitting of the atom is giving us even more. Some have important industrial uses as ions and have large markets as chemical compounds. But this fact does not alter the possibilities of using them in metallic form. True rarity of occurrence makes it probable that some will never be metals of commercial importance; but even here we should be cautious, since very special properties could make them of exceptional economic significance.

Others among the "unused" metals have properties that do not make them useful at the present stage of technology. The remainder are not used because technology has not advanced to the point where latent usefulness can be recognized. When we remember that titanium, zirconium, beryllium, and germanium were in the same relative positions twenty years ago as, say, rubidium, cesium, and barium are today, we refrain from minimizing potentialities. In the whole science of "rare" metals, more is unknown than known. We have just enough information to suspect that these unused metals constitute a reserve storehouse from which we can draw new and unusual materials to supplement the more familiar ones in building our industrial future. Research, such as that being conducted in the facilities we discussed yesterday, is the key to this storehouse.

VIII. The Growth Industries

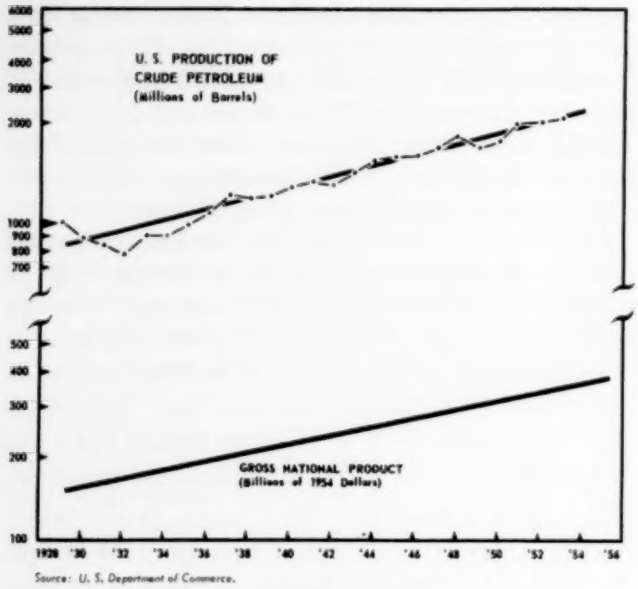
More examples of areas of technology that will create future business could be cited, but before closing I should like to call your attention to the growth curves of typical industries that are based on technology. To me, these curves tell more forcefully than anything else the story of America's dynamic technological economy. And, by their determined upward sweeps, they are indicative of the promise of the future.

Figure 7 shows the production of primary aluminum in short tons over a 25-year period. It is plotted on a semilogarithmic scale so that the growth trend for recent years may be logically approximated by a straight line. The broken line shows actual production; the heavy straight line, growth trend. Deviations from the straight line are those caused by war, depression, inflation, recession, and artificial factors, such as governmental control and stockpiling. Note the World War II peak and the low that occurred after the cessation of hostilities. Note also how rapidly the war peak was attained and surpassed in the postwar economy.

You will recall that much research was done following the war on the finding of civilian uses for aluminum. How successful this research was is dramatically portrayed by this growth curve. We see the physical manifestations of this research every day in such things as aluminum-paneled skyscrapers, aluminum transmission lines, aluminum wrappings for food products, aluminum insulation, windows, storm doors, and hundreds of other highly useful civilian products.

In Figure 8, a similar curve and trend approximation is shown for steel production. Steel is an older, well-established metal in our economy, and thus the line representing its growth does not rise as rapidly as that representing the growth of aluminum. But, because the steel industry is research-minded—is constantly finding more uses for its products—steel is growing slightly faster than the country's total productivity. This is demonstrated by the slopes of the heavy lines in Figure 9.

The top line represents the trend for steel production and the lower one the trend for gross national product. The difference in their slopes, as you can


U. S. PRODUCTION OF
CRUDE PETROLEUM
(Millions of Barrels)
GROSS NATIONAL PRODUCT
(Billions of 1954 Dollars)
1928 '30 '32 '34 '36 '38 '40 '42 '44 '46 '48 '50 '52 '54 '56

Source: U. S. Department of Commerce.

FIGURE 12

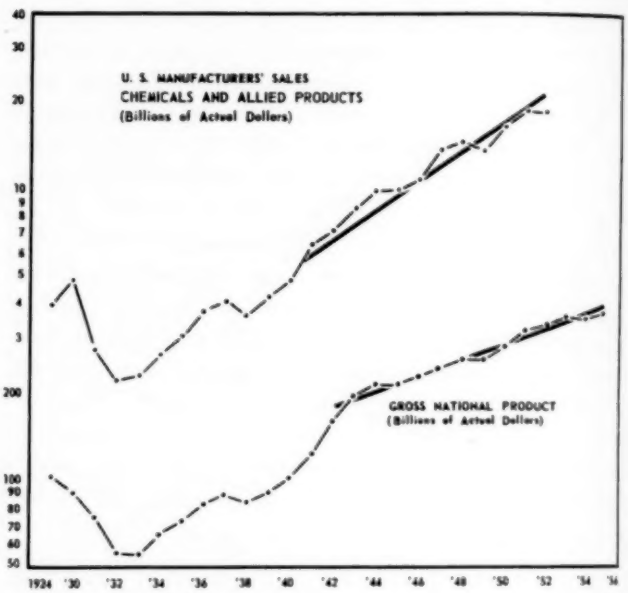
see, is not great. In general, after an industry based on technology has gone through its early period of extremely rapid growth, it settles down to a more moderate rate of growth consonant with that of the economy as a whole. Such industries then become mainstays or supporting structures for continued progress.

But the plastics industry, as you can see from Figure 10, is an "upstart". It is by no means ready to settle down to a trend similar to that of the general economy. It is a new, research-created industry, in its heyday of upsurging growth. Plastics are the fastest growing nonmetallic engineering materials, just as aluminum is the fastest growing metal. It is interesting to note that the present production tonnages of these two popular materials are nearly equivalent—namely in the range of 1-1/3 million tons.

And, commercial aviation is also extremely dynamic. Figure 11 shows the trends for freight and passenger transport by the airlines.

But U.S. production of crude petroleum (Figure 12) shows a more moderate growth rate. Crude petroleum production, like steel production, is an older activity. Also, in the interest of conservation, the output of producing wells is controlled by industry regulation. It is actually remarkable that petroleum producers can maintain such a growth trend. Petroleum is more difficult to find than formerly, and drillers must go deeper —even explore offshore ocean bottoms. Without research on methods for finding petroleum and getting it above ground, this growth trend might be going down instead of up.

In Figure 13, the growth of manufacturers' sales of chemicals and allied products is shown. Since actual dollar figures are used for sales, gross national product is also represented in actual dollars for comparison purposes. As the recent trend lines indicate, chemical sales are advancing at a faster rate than gross national product. The old mainstay industrial chemicals, comprising the bulk of sales and progressing at a rate fairly consistent with gross national product, tend to obscure the sensational advances made by plastics, detergents, and other of the newer chemicals. The difference in the slopes of the trend lines here may be


U. S. MANUFACTURERS' SALES
CHEMICALS AND ALLIED PRODUCTS
(Billions of Actual Dollars)
GROSS NATIONAL PRODUCT
(Billions of Actual Dollars)
1924 '30 '32 '34 '36 '38 '40 '42 '44 '46 '48 '50 '52 '54 '56

Source: U. S. Department of Commerce.

FIGURE 13

attributed primarily to the new chemicals developed through research in the past 15 to 20 years.

Machinery sales trends (Figure 14) show a similar gradual breaking away from the gross national product trend. Machinery is a high volume business and to tilt the trend line upward ever so slightly from gross national product requires great expenditures for research and development.

One of the most dramatic of all the growth industries is electronics. In Figure 15, its growth is shown and the trend since 1949 is indicated. Note that the line for recent growth trend is fully 45 degrees steeper than the line representing gross national product.

Sales of electronic products aggregated about $500 million in 1940. At the peak during World War II, such sales amounted to $4.6 billion or nine times as much. Last year's sales totaled $8.8 billion—almost 18 times the 1940 figure and nearly twice the wartime

high. Television, and to a lesser degree military electronics, are responsible for the present rate of growth. Probably, the emphasis in future growth will shift to electronic devices and instruments required for the automation of industry and commerce.

Research Effort and Economic Growth

In presenting these graphs of growth industries and in commenting on them, I have refrained from making the qualifying statements that would be necessary for a more comprehensive and scholarly interpretation. However, I know you will appreciate that my point has been to establish the validity of the relationship between research effort and economic growth, and in the limited space available we have had to make rather broad generalizations. Some people might look at the same curves and conclude, yes, it is war that causes economic progress. With those who wish to take such a dim view, I will agree in part: It was World War II that triggered off the Technological Revolution, but eventually, I believe, we would have achieved the same thing without war—although it would have taken us longer to reach our present economic level.

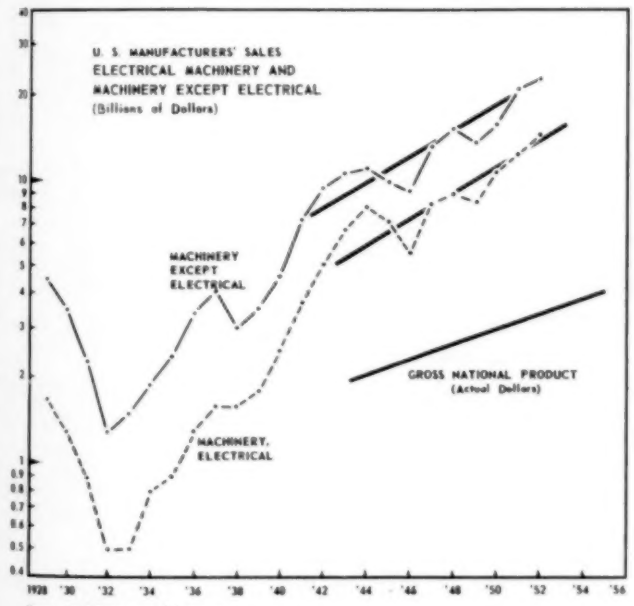

U. S. MANUFACTURERS' SALES
ELECTRICAL MACHINERY AND
MACHINERY EXCEPT ELECTRICAL
(Billions of Dollars)
MACHINERY EXCEPT ELECTRICAL
GROSS NATIONAL PRODUCT
(Actual Dollars)
MACHINERY, ELECTRICAL
1928 '30 '32 '34 '36 '38 '40 '42 '44 '46 '48 '50 '52 '54 '56
Source: U. S. Department of Commerce.

FIGURE 14

Many people in research have made similar analyses of the contributions of research to economic growth. Raymond H. Ewell, in charge of program analysis for the National Science Foundation, in a recent speech offered some speculative calculations regarding the payoff from research. He estimated that the net contribution to the nation's gross output in 1953 from research done from 1928 to 1953 inclusive, was of the order of $43 billion to $86 billion. Using $1.2 billion as the average research expenditure for these years, the indicated payoff would be nearly 36 dollars for every dollar spent!

And this figure is probably low—for the reason that much of the research done in the years immediately preceding 1953 had probably not begun to pay off. Most of the benefits from the $15 billion spent on research in the last five years are still ahead.

Trying to transpose such information as has been discussed to the analysis of investments is outside the specific purpose of this article. However, some general observations of one intensely interested in the relationship between research and investments may be in order. We all know that attention is being focused on research activity as a guiding factor in locating investment opportunities with a sound base and promising future growth. As you fully realize, of course, research is only one of many factors affecting the business outlook of a company. And, it is very difficult to appraise research activity. The mere expenditure of dollars in a research program does not insure success, unless the program itself is being well planned, executed, and timed, and unless the results are exploited wisely and advantageously.

Numerous cases of companies could be cited that show good correlation between growth and a relatively high well executed research effort. Similarly, cases could be cited in which failure to grow correlates with little or no research effort. Frequently, the stock of a company that is active in research is in most active demand, but this demand may or may not be related to public appraisal of, and faith in, the company's research effort. Other powerful factors may control the situation. Some companies doing only a

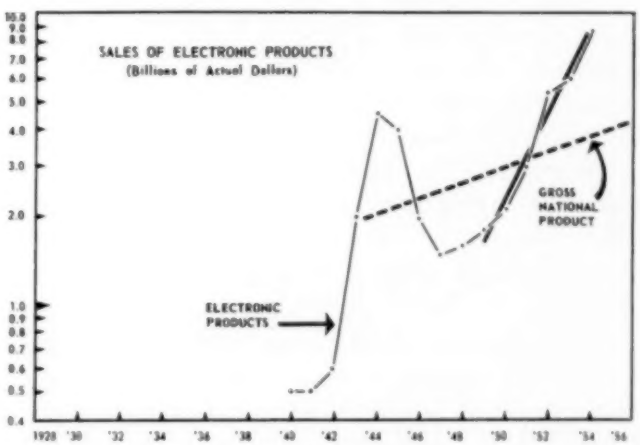

SALES OF ELECTRONIC PRODUCTS
(Billions of Actual Dollars)
GROSS NATIONAL PRODUCT
ELECTRONIC PRODUCTS
1928 '30 '32 '34 '36 '38 '40 '42 '44 '46 '48 '50 '52 '54 '56

FIGURE 15

modest amount of research may also be in demand because of especially fortuitous positions not created by themselves. Thus, at the present, the stock of companies likely to receive business windfalls because of nuclear energy development or because of plans for the St. Lawrence Waterway may be in high demand.

A word of warning in judging the size and effectiveness of research effort by different companies is appropriate. In the first place, it is difficult to determine even such a basic yardstick as dollars spent on research for the great majority of companies. Very few of them reveal these figures in annual reports or other releases to the public. Those that do permit figures to be quoted in various surveys are generally those that are proud of relatively high effort and expenditures for research. Then, again, the question of what is research enters into the picture. Some companies may include expenditures for laboratory control work, trouble shooting, and customer servicing in with expenditures for bona fide research and development. Such auditing practices would be misleading to one trying to use research expenditure as a guide to his investments.

Also, too much faith should not be put in the ratio of dollars spent on research to dollars of sales. If the materials costs of a company are great in reference to the value added by manufacture, the magnitude of gross sales would tend to depress the ratio and give a fictional appraisal of research activity. Relatively large companies that are active in research will generally show ratios of from 2 to 5 per cent. But large oil companies with huge sales that support strong research programs may show ratios of much less than one per cent. As pointed out previously, the petroleum industry as a whole spends only 0.6 per cent of sales. Yet the aggregate is large and the petroleum industry is among the most progressive of industries.

Each individual case must be judged on its own set of circumstances. But, by and large, we can say that research effort is a powerful beacon leading to sound investments. And research, by keeping the American economy strong and dynamic and engendering faith in the future, is making all soundly based investments more secure.

"Industrial technology provides the extra food on the table, the extra mile on the speedometer, the extra dollar in the wallet. It is the extra bushel in the barn, the extra suit in the closet, the extra diploma at commencement time. It is extra hours of leisure, the extra years of health and of life, the extra measure of security.

"Our very security as a free people is dependent upon our capacity to produce and to employ the most modern industrial techniques."

—Henry B. duPont

Notes From Battelle

ATOMIC ENERGY TRADE FAIR

"Industrial Research in Atomic Energy" will be the theme of Battelle's exhibit at the first U. S. Trade Fair of the Atomic Industry. As one of over 70 exhibitors at the Fair, the Institute will show applications of radioisotopes and the development of atomic reactor materials and components.

The Fair is sponsored by the Atomic Industrial Forum, a nonprofit organization of more than 300 industrial companies and research and educational institutions engaged in developing and applying atomic energy for peaceful purposes. The object of this pioneering trade fair is to demonstrate the importance which peaceful atomic energy and its associated products and services have in our industrial economy.

The Fair will be held at the Sheraton-Park Hotel in Washington, D. C. from September 26 to 30, in conjunction with the Forum's fall meeting.

FOR BETTER FORGING AND EXTRUDING

The increase in the size of presses now available for forming metals has brought with it a number of problems. The selection and proper use of lubricants, for example, can be of great importance in getting full advantage of large presses in hot forging or extruding operations.

Homer L. Shaw of Battelle, who guided an Air Force-sponsored investigation on lubrication problems in connection with the forging and extrusion of aluminum and magnesium, reports these findings:

- Increasing the die temperature to that of the aluminum or magnesium billet greatly improves penetration of the metal into the die cavity.
- With the same graphite size and concentration and with similar spraying times, higher viscosity mineral oil carriers produced better die filling than did lower viscosity carriers.
- Size of graphite particles appears to have little influence on depth of penetration into die cavities.
- Tetrafluoroethylene resin primer (a low-viscosity dispersion in essentially a water medium) developed for use with steels, produces exceptionally good die filling in work with aluminium when applied to dies cold and then heated to 700 F to cure the resin. However, if heated to 750 F, the lubricant gives off toxic fumes. The lubricant is also effective in forging magnesium if the dies are heated to at least 600 F to cure the resin. A satisfactory method of applying the resin to hot dies is yet to be found.
- Excellent die filling was achieved with aluminum billets which were first etched in sodium hydroxide and dipped in a water suspension of colloidal graphite before heating. They were then forged with conventional lubricants on the dies.
- Dipping magnesium billets, with slightly roughened surfaces, into an aqueous suspension of colloidal graphite before heating and forging them with conventional lubricants, greatly improved die filling.

TALLOW-ACID LACQUERS

In a recent investigation, Battelle chemists found evidence that tallow fatty acids are excellent potential raw materials for use in the formulation of nondrying alkyd resins. Such alkyds are widely used in nitrocellulose lacquers and baking enamels with urea or melamine resins.

G. A. Lutz and R. F. Schwartz report that they studied the behavior of the tallow acid alkyd they prepared in both black and white automotive lacquer topcoats. Their investigation disclosed that tallow acid lacquers, when diluted, tolerated a lower viscosity at higher solids than did the control; possessed sanding properties similar to those of the control; had buffing qualities at least equal to those of the control; and had patching properties slightly better than the control. Baked panels remained in excellent condition after three months' exposure in Florida.

The chemists believe the tallow acids deserve study for other possible uses and that they might become an important material if a stable and competitive price for tallow can be established.

VICE PRESIDENTS NAMED

DR. B. D. THOMAS, David C. Minton, Jr., and John S. Crout have been named Battelle vice presidents. All three have long been associate directors, and, along with President Clyde Williams, comprise the key policy-making and executive team in Battelle management.

"This formalizes the official status of our top management team", said Dr. Williams in announcing the appointments. "These men, originally trained as scientists and engineers, have worked closely with me in welding the 2500 people who comprise our organization into a harmonious group. Through a diversity of talents in the skills required for sound administration and growth, our executive team has been able to bring to problems a unique approach which combines the viewpoints and judgments of businessmen and technical men. These three men, with their diverse technical backgrounds and experience, first in research in their chosen fields and then in management, make a real team."

Thomas is a physical chemist; Minton, a mining and metallurgical engineer; Crout, a mechanical engineer. Williams was employed first in the chemical industry and then in the steel industry.

"All four members of the policy-making team work together with only general assignments of responsibility and with complete interchangeability in the absence of one another", Dr. Williams continued.

"It is this system of team effort carried on at every level that has permitted Battelle to expand in the course of 25 years to become an international research institution, with laboratories in Columbus, Ohio; Geneva, Switzerland; and Frankfurt, Germany."

Thomas, a veteran of 21 years on the Battelle staff, has had various managerial responsibilities. For many years, he has served as acting director of the Institute in the absence of Dr. Williams. He is also secretary to the Battelle board of trustees. Currently, he is executive in charge of the Institute's European operations. He also has primary responsibility for the Institute's business management and for the administration and quality control of research projects.

Minton, in addition to serving on the four-man planning and policy team, has primary responsibility for the Institute's relations with industrial and governmental clients. In this function, he represents the Office of the Director in the development and promotion of research sponsorships, the negotiation of contracts, and the maintenance of good relations between the Institute and its clients. He had wide experience in the planning of research programs and has guided the formation of numerous industrial groups for the conduct of research. Mr. Minton first joined the Battelle staff in 1941, but spent the war years in Washington administering portions of the country's wartime metallurgical research.

Crout, who joined the Battelle organization in 1941, also has had varied responsibilities, including representative of the Office of the Director in many of Battelle's business planning and organizational activities. He has been largely instrumental in the development of policies and programs relating to the Institute's formal and informal relations with employees and the public, and currently is executive in charge of personnel and public relations policies. He also heads the Battelle Development Corporation, the patent-holding subsidiary of Battelle Institute, and has over-all responsibility for the supervision of physical plant and maintenance of equipment.

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Battelle's technical information division has added to the staff of Battelle's downtown office in Washington, D. C. These staff members help to speed communication of information between Washington and Battelle and to make the wealth of material available in the Washington area libraries more easily accessible to the Battelle staff. They also carry on studies at the Library of Congress for Battelle's government research contracts. Through use of the teletype and other methods of communication, the new facilities make possible more rapid interlibrary loan service, faster photostat and microfilm service, and decrease the time required of those visiting Washington to search for special information.

Writings by Staff Members*

Ceramics for Rockets. W. H. Duckworth and J. J. Krochmal. *Ordnance*, May-June, 1955, pp. 999-1001.

Lining the motors of jet-propulsion power plants with ceramics can solve the troublesome problems of heat transfer and erosion of the nozzle throat due to chemical or mechanical causes.

The Effects of Alloying Elements on Welds in Titanium, II. C. E. Faulkner. *Welding Journal*, June, 1955, pp. 295S-312S.

Reports on test welds on experimental titanium alloys which were made to show how the alloying elements affected the properties of the welded joints. The various alloys studied contained aluminum, chromium, iron, manganese, molybdenum, and vanadium, singly and in combinations.

The Static and Fatigue Behavior of Spot-Welded Joints in Titanium. W. H. Kearns, W. S. Hyler, and D. C. Martin. *Welding Journal*, May, 1955, pp. 241S-250S.

Describes the results of static and fatigue tests on spot-welded joints in titanium and stainless steel sheet. A comparison is made of the fatigue behavior of six-spot joints in titanium, stainless steel, and aluminum sheet.

Electrochemical Society, Journal, June, 1955. Contains these papers by Battelle staff members:

Reaction of Nitrogen With Uranium. M. W. Mallett and A. F. Gerds. pp. 292-296.

Rates of reaction of nitrogen with uranium were found to obey a parabolic law in the temperature range of 550 to 900 C at one atmosphere pressure.

A Metallurgical Evaluation of Iodide Chromium. D. J. Maykuth, W. D. Klopp, R. I. Jaffee, and H. B. Goodwin. pp. 316-331.

Reports results of an investigation on the fabricability and bend ductility of arc-melted, high-purity chromium. Both the purity and the physical condition were shown to be important factors in determining the degree of ductility which chromium will show at room temperature.

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**Members of the Battelle staff are authors of the recently published articles and books listed on this page. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.*

Organ-Pipe Oscillations in Deep-Ported Burner. Abbott A. Putnam and William R. Dennis. *Industrial and Engineering Chemistry*, June, 1955, p. 1184.

Discusses a theoretical and experimental study of the sound generated by a burner made up of a small cylindrical plenum chamber, a bank of deep burner ports, and a cylindrical combustion chamber.

Evaluation of Effects of Surfactants in Fertilizer Manufacture. F. A. Retzke, G. F. Sachsel, and R. B. Filbert, Jr. *Journal of Agricultural and Food Chemistry*, June, 1955, pp. 496-499.

Surfactants were found to have very limited usefulness as anticaking agents in mixed fertilizers when their effect was compared with that obtained by granulating fertilizers. A search for simple laboratory tests of surfactants to screen them for use with fertilizers was unsuccessful.

Problems Encountered and Procedures for Obtaining Short-Term Life Ratings on Resistors. W. T. Sackett, Jr. *Institute of Radio Engineers, Transactions on Component Parts*, April, 1955, pp. 15-29.

Discusses problems in testing to determine short-term life ratings of electronic components, such as the definition of "life", the variables of specimen conditioning and testing, and representative sampling. Describes a stress-step procedure for life testing of composition resistors at elevated temperatures.

Vacuum Induction—Melted Zirconium and Zirconium Alloys. H. A. Saller, R. F. Dickerson, and E. L. Foster, *Vacuum Metallurgy*, Transactions of the Vacuum Metallurgy Symposium of The Electrochemical Society, October 6 and 7, 1954.

Presents a discussion of a successful vacuum-induction melting technique used to melt sponge zirconium and some of its alloys. Various properties of this material, including hardness, tensile properties, drawability, ductility, and electrical resistivity were determined and a comparison made of the induction melted material and high-purity arc-melted iodide zirconium.

A Metallurgist's Challenge to the Vacuum Engineer. H. A. Saller and R. F. Dickerson. *Vacuum Symposium Transactions*, Committee on Vacuum Techniques, June, 1954.

The field of vacuum metallurgy is discussed briefly and a review of the required ultimate vacuum, the pumping speed requirements, and the various specialized needs of each process is presented.

ABSTRACT INDEX

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BATTELLE TECHNICAL REVIEW ABSTRACTS

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AERONAUTICAL ENGINEERING

11031* The Drag of Non-Planar Thickness Distributions in Supersonic Flow. E. W. Graham, B. J. Beane, and R. M. Licher. *Aeronautical Quarterly*, v. 6, May 1955, p. 99-113.

Includes diagrams. 6 ref.

11032* Supersonic Flow Past Slender Bodies With Discontinuous Profile Slope. L. E. Fraenkel and H. Portnoy. *Aeronautical Quarterly*, v. 6, May 1955, p. 114-124.

Slender body solution; drag force; lateral forces and moments; winged bodies of revolution. Diagram. 7 ref.

11033* The Lift of Twisted and Cambered Wings in Supersonic Flow. G. N. Lance. *Aeronautical Quarterly*, v. 6, May 1955, p. 149-163.

A generalized conical flow theory to deduce an integral equation relating the velocity potential on a delta wing (with subsonic leading edges) to the given downwash distribution over the wing. Diagrams, tables. 8 ref.

11034 An Investigation of the Melting of Bodies Due to Aerodynamic Heating. C. H. McLellan. *ASME, Transactions*, v. 77, July 1955, p. 727-733.

Results of melting tests of several bodies made of a low-melting-temperature alloy are discussed. Graphs, diagrams, table, photographs. 8 ref.

11035 The Thermal Barrier—Structures. N. J. Hoff. *ASME, Transactions*, v. 77, July 1955, p. 759-763.

Problems encountered are thermal buckling, stresses, creep, and creep failure in tension. Graphs, photograph. 4 ref.

11036 Continuous Supersonic Wind Tunnel. I. Main Installation With Mach Range of 0·3 to 3. *Engineering*, v. 179, June 24, 1955, p. 797-800.

Includes diagrams, graphs, photographs. (To be continued.)

11037* Jet-Airliner Systems. *Flight and Aircraft Engineer*, v. 67, May 27, 1955, p. 734-738.

Electric, hydraulic, air conditioning, pressurization, and fuel supply systems. Diagrams.

11038 A New Laboratory Technique for Investigation of the Origin of Fluid Turbulence. Elisha N. Fales. *Franklin Institute, Journal*, v. 259, June 1955, p. 491-515; disc., p. 517-518.

Describes a laboratory technique which provides a new approach to the unsolved problem of fluid turbulence. The subject matter concerns chiefly the aerodynamics of the airplane, but also applies to the general field of fluid mechanics. Photographs, graphs.

11039 A Versatile Automatic Data Separation System for Pulse Multiplex Telemetering Systems. Irving P. Magasiny. *Institute of Radio Engineers, Transactions on Telemetry and Remote Control*, v. 1, Feb. 1955, p. 5-15. (TK1 In6.6r)

Discussion on a data-separation system which was specifically designed to fill the needs of guided missiles and modern high speed aircraft. Photographs, diagrams, tables.

11040* Theory of the Stabilization of the Course of a Neutral Aircraft by Means of an Autopilot With Constant Servomotor Speed. **Teoriia stabilizatsii kursa neitral'nogo samoleta pri pomoshchi avtopilota s postoiannoi skorost'iu servomotora. I.** The Absence of a Zone of Sensitivity. **Sluchai otsutstviia zony nechuvstvitel'nosti.** (Russian.) A. A. Andronov and N. N. Bautin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 3, Mar., p. 3-32.

Includes graphs, diagrams. 9 ref.

11041* Rayleigh's Problem for a Cylinder of Arbitrary Shape. II. (English.) Hidenori Hasimoto. *Physical Society of Japan, Journal*, v. 10, no. 5, May 1955, p. 397-406.

Derivation of the general formula for the frictional drag on a cylinder of arbitrary cross-sectional shape with no corners. Diagrams, graphs, table. 10 ref.

11042* Size of the Local Supersonic Zone in the Case of a Stream of Compressed Gas Flowing Around a Wedge. **O velichine mestnoi sverkhzvukovoi zony pri obtekanii klina potokom szhimaemogo gaza.** (Russian.) S. K. Aslanov. *Prikladnaia Matematika i Mekhanika*, v. 19, no. 3, May-June 1955, p. 359-362.

Analysis of velocity distribution patterns. Graphs. 7 ref.

11043* Application of the Theory of Homogeneous Movements to the Calculation of the Wave Drag of Tapered Swept-Back Wings. **Application de la théorie des mouvements homogènes au calcul de la traînée d'onde d'ailes en flèche effilées.** (French.) M. Fenain and D. Vallée. *Recherche Aéronautique*, 1955, no. 44, Mar.-Apr. 1955, p. 9-21.

Use of linear approximations to study the influence of two parameters on the wave drag. Diagrams, graphs. 4 ref.

11044 Making Aeroplanes Independent of Runways. Georges Hereil. *Royal Aeronautical Society, Journal*, v. 59, June 1955, p. 381-413; disc., p. 413-414.

Launching devices; landing equipment; aircraft modifications. Diagrams, photographs, tables. 108 ref.

11045* Aerodynamic Rules on the Installation of Jet-Engine Nacelles. **Aerodynamische Regeln für den Einbau von Strahltriebwerksgondeln.** (German.) Gerhard Schulz. *Zeitschrift für Flugwissenschaften*, v. 3, no. 5, May 1955, p. 119-129.

Difficulties involved in the attachment of jet engines. Diagrams, graphs, table. 10 ref.

11046* Approximate Method for Calculating the Turbulent Boundary Layer When There Is Heat Exchange. **Priblizhennyi metod rascheta turbulentnogo pogranichnogo sloia pri nalichii teploobmena.** (Russian.) M. B. Skopets. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 5, May 1955, p. 864-876.

Method is based on equations of impulses and energy, and on the assumption of similarity between laminar and turbulent boundary layers. Graphs, tables. 4 ref.

See also:

11559 (photographic flight path recorder)
11562 (photography in guided missile research)

AGRICULTURE

11047* Laboratory Evaluation of Fungicides for the Preservation of Moist Grain. R. U. Schenk and W. K. Kennedy. *Agronomy Journal*, v. 47, Mar. 1955, p. 128-130.

Includes diagram, graphs, table. 5 ref.

11048 Antifungal Agents. Stephen B. Coan and Dominick Papa. *American Chemical Society, Journal*, v. 77, May 5, 1955, p. 2402-2404.

A series of tertiary aliphatic and heterocyclic amines were prepared and examined as antifungal agents for pathogenic molds and fungi. Tables. 7 ref.

11049 Insecticidal Phosphates Obtained by a New Rearrangement Reaction. W. F. Barthel, B. H. Alexander, P. A. Giang, and S. A. Hall. *American Chemical Society, Journal*, v. 77, May 5, 1955, p. 2424-2427.

From O,O-dialkyl 2,2,2-trichloro-1-hydroxyethyl phosphonates to dialkyl 2,2-dichlorovinyl phosphates by dehydrochlorination. Table. 5 ref.

11050 The New Insecticide O,O-Dimethyl 2,2,2-Trichloro-1-Hydroxy-Ethylphosphonate. W. Lorenz, A. Henglein, and G. Schrader. *American Chemical Society, Journal*, v. 77, May 5, 1955, p. 2554-2556.

Condensation, toxicity, and identification. Table, infra-red spectra. 11 ref.

11051* Studies of Mineral Nutrition by Use of Tracers. Orlin Biddulph. *Botanical Review*, v. 21, May 1955, p. 251-295.

Procedures; absorption; translocation; metabolism; radiation injury. 218 ref.

11052 Agglomeration—A Chemical Engineering Tool for Granulating Mixed Fertilizers. John O. Hardesty. *Chemical Engineering Progress*, v. 51, June 1955, p. 291-295.

Process suitable for a product with minimum caking, segregation, dustiness, and good drillability. Tables, graph, photographs. 19 ref.

11053 High Copper Mineral Mixture for Fattening Pigs. R. S. Barber, R. Braude, and K. G. Mitchell. *Chemistry & Industry*, 1955, no. 21, May 21, p. 601.

Mild gains are shown over the first eight weeks of growth. Tables. 3 ref.

11054* What New Crops Does Industry Need? K. Starr Chester. *Chemurgic Digest*, v. 14, May 1955, p. 8-10.

New vegetable raw materials that agriculture might supply which would be an improvement over present raw materials from the standpoint of quality, economy, ease of handling, and necessity of importation.

11055* It Regulates Plant Growth. Maleic Hydrazide. H. Douglas Tate. *Chemurgic Digest*, v. 14, May 1955, p. 14-16.

A close look at a plant growth inhibitor stamped by experts as one of the significant developments in agricultural chemicals field. Photographs.

11056* Effect of Radiophosphorus on the Growth and Development of Oats in Relation to the Conditions of Phosphate Feeding. **Deistvie radiofosfora na rost i razvitie ovsa v zavisimosti ot uslovii fosfatnogo pitaniia.** (Russian.) A. G. Shestakov, G. F. Ivanova, and N. I. Shmel'kova. *Doklady Akademii Nauk, SSSR*, v. 102, no. 2, May 11, 1955, p. 395-397.

Includes tables. 4 ref.

11057 Evaluation of Effects of Surfactants in Fertilizer Manufacture. F. A. Retzke, G. F. Sachsel, and R. B. Filbert, Jr. *Journal of Agricultural and Food Chemistry*, v. 3, June 1955, p. 496-499.

Tests for solubility, stability, and foaming of surfactants in sulfuric acid and ammonium hydroxide, and similar tests for effects on surface tension of sulfuric acid, were found to be of doubtful value for screening surfactants. Bag-storage tests with 3-12-12 having surfactant added at various stages of production showed a slight and somewhat inconsistent benefit with some surfactant treatments. Tables, graph. 10 ref.

11058* Forest Growing Stock. L. S. Gross. *Journal of Forestry*, v. 53, June 1955, p. 403-408.

Application of growing stock goals; normal distribution of growing stock. Tables. 5 ref.

11059* Forest Production in a Dynamic Economy. Albert C. Worrell. *Journal of Forestry*, v. 53, June 1955, p. 447-450.

Includes table, graph.

11060* Spraying Tomatoes With Fixed Coppers and Carbamates. M. C. Strong. *Michigan State College, Agricultural Experiment Station, Quarterly Bulletin*, v. 37, no. 4, May 1955, p. 477-485.

A 5-yr. study of control of leaf blights and anthracnose on tomato; advantages of spray combinations of various fixed coppers and ziram (zinc dimethyldithio carbamate) over either fungicide used separately or in an alternating spray schedule. Tables, photographs. 6 ref.

11061* Discussion of Problems of Soil Microbiology. **K diskussii po voprosam pochvennoi mikrobiologii.** (Russian.) T. V. Aristovskaia. *Mikrobiologiia*, v. 24, no. 3, May-June 1955, p. 359-363.

Role of bacteria in soil. Methods of study, ecological approach, and seasonal variations. 7 ref.

11062 Labeling Locusts With Radioactive Isotopes. H. B. D. Kettlewell. *Nature*, v. 175, May 7, 1955, p. 821-822.

Insects are fed P^{32} labeled foods. 2 ref.

11063* Compatability Between a Streptomycin-Terramycin Formulation and Copper in the Control of Bacterial Blight of Celery. R. S. Cox. *Plant Disease Reporter*, v. 39, June 1955, p. 484-486.

Agrimycin and neutral coppers, alone and in combination, gave a high degree of control. The materials in combination were more effective than either when used alone. Table. 5 ref.

11064* Effects of Ionizing Radiations on Seeds of Barley. Richard S. Caldecott. *Radiation Research*, v. 2, June 1955, p. 339-350.

Experiments conducted in an attempt to devise a means of modifying some cellular constituents of the dormant seed without actually initiating cell division or changes in the chromosomes which alter the kinds of aberrations induced by X-rays. Graphs, table, photographs. 8 ref.

11065 Numerical Values and Quantitative Determinations in Microscopy. T. E. Wallis. *Research*, v. 8, June 1955, p. 226-234.

Microscopy of vegetable products. Diagrams, micrographs. 15 ref.

11066* The Biocidal Properties of Organic Tin Compounds. **De biocide eigenschappen van organische tinverbindingen.** (Dutch.) J. G. A. Luijten. *T.N.O.-Nieuws*, v. 10, no. 110, May 1955, p. 170-183.

Insecticidal, fungicidal, and anti-fouling properties, and uses of numerous Sn compounds. Tables, photographs.

11067* Vofatox—New, Effective Preparation for Controlling the (Eurygaster) Bug. **Vofatoks—novyi effektivnyi preparat v bor'be s klopom-cherepashkoi.** (Russian.) G. A. Chigarev. *Zemledelie*, v. 3, no. 6, June 1955, p. 99-102.

A new synthetic from the group of phosphoro-organic compounds is a highly effective dust against wheat bugs, cabbage flies, aphids, and scales. Table.

11068* Chemical Structure and Parasitocidic Activity. **Khimicheskoe stroenie i parazitotsidnaia aktivnost'. XVIII.** Substituted Forms of Benzyldiethylamines. **Zameshchennye benzildietilamina.** (Russian.) V. I. Stavrovskaia. *Zhurnal Obshchei Khimii*, v. 25, no. 5, May 1955, p. 951-956.

Synthesis of ten compounds. Table. 11 ref.

See also:

11157 (analysis of plant tissues)
12146 (biogeochemical prospecting)
12271 (use of agricutural residues)
12418 (tree farming)

BIOCHEMICAL AND BIOPHYSICAL RESEARCH

11069 Ionic Inhibition of Bacterial Growth. II. Relationship of Ionic Inhibition to DNA-Protein Biosynthesis. Thomas J. Bardos, Harry L. Gordon, and Elsie F. Heenan. *American Chemical Society, Journal,* v. 77, June 5, 1955, p. 3115-3119.

Vitamin B_{12} requirement of *Lactobacillus leichmannii* 313 studied at different ionic levels. Tables, graphs. 13 ref.

11070* Morphology of *Bacterium Tularense* During Its Growth Cycle in Liquid Medium as Revealed by the Electron Microscope. E. Ribi and C. Shepard. *Experimental Cell Research,* v. 8, June 1955, p. 474-487.

Includes micrographs, graph. 14 ref.

11071* X-Ray Diffraction and Chemical Examination of Some Irradiated Nucleic Acids. K. Little and P. W. Kent. *Journal of Nuclear Energy,* v. 1, June 1955, p. 280-285.

Results of two different lines of investigation—the irradiation of solid nucleic acids and other high polymers with massive doses of ionizing radiations, and the irradiation of nucleic acids in solutions of a type approaching the biological. 12 ref.

11072* The Vitamins: Recent Research. I. F. A. Robinson. *Manufacturing Chemist,* v. 26, June 1955, p. 262-264.

Work on standardization of vitamin D and thiamine reported. 55 ref.

11073 Genetic Damage Produced by Radiation. H. J. Muller. *Science,* v. 121, June 17, 1955, p. 837-840.

Contends that further rational nuclear research is a safer course despite our present dilemma. 8 ref.

11074 The Mutation of Viruses. C. A. Knight and Dean Fraser. *Scientific American,* v. 193, July 1955, p. 74-78.

Recent experiments suggest that it may soon be possible to alter their inborn characteristics predictably by chemical means. Photographs, table.

Books and Miscellaneous Publications

11075 Methods in Enzymology. Sidney P. Colowick and Nathan O. Kaplan, editors. v. I. 835 p. 1955. Academic Press, New York. (QP601 C71m)

General considerations of the methodology involved in the extraction of enzymes from various types of cells and in the fractionation of enzymes by salts, organic solvents, absorbents, and chromatography. Description of the assay, purification, and properties of individual enzymes.

See also:

11214 (nutrition and biochemistry literature review)

CERAMICS AND CONCRETE

11076 Barium Titanate and Other Ceramic Ferroelectrics: I. Introduction. Malcolm McQuarrie. *American Ceramic Society Bulletin,* v. 34, June 1955, p. 169-172.

Historical survey; ferroelectricity; Perovskite crystal structure; piezoelectricity; single crystals; newer ferroelectrics; anti-ferroelectricity. Graphs, diagram, table. 25 ref.

11077 Effect of Atmosphere on Refractories. Hobart M. Kraner. *American Ceramic Society Bulletin,* v. 34, June 1955, p. 173-176.

Covers a number of factors of furnace operation which affect the life of refractories. These include dusts and their absorption by the refractory, vapor pressure of certain materials normal to metallurgical processes, variation of percentages of gaseous components, and the effect of temperature alone on the constitution of important constituents of the refractory. Tables, graphs, diagram, photograph. 4 ref.

11078 Factors Affecting the Physical Structure of Dry Pressed Steatite. J. R. Fisher and J. F. Potter. *American Ceramic Society Bulletin,* v. 34, June 1955, p. 177-181.

General requirements for dry processing; standard method for processing steatite units. Micrographs, graphs, table. 6 ref.

11079 Ceramic Raw Materials for the Welding Electrodes Industry. William T. DeLong and Harry F. Reid, Jr. *American Ceramic Society Bulletin,* v. 34, June 1955, p. 183-185.

Functions of an electrode coating; materials used; raw material requirements; current material needs for the industry. Tables, diagrams.

11080 Mechanism of Material Transport During Sintering. Raymond F. Walker. *American Ceramic Society, Journal,* v. 38, June 1955, p. 187-197.

Evaporation-condensation mechanism; surface and volume diffusion; macroscopic flow mechanisms; viscous and plastic flow; significance of sintering atmosphere. Graphs, micrographs, tables, diagrams. 36 ref.

11081 New Data on Thermal Decomposition of Kaolinite and Halloysite. Rustum Roy, Della M. Roy, and E. E. Francis. *American Ceramic Society, Journal,* v. 38, June 1955, p. 198-205.

Includes micrographs, electron diffraction patterns, diagrams. 9 ref.

11082 Some Physical Factors Affecting the Internal Damping of Glass. S. L. Blum. *American Ceramic Society, Journal,* v. 38, June 1955, p. 205-210.

An apparatus for accurately measuring the internal damping of fine fibers *in vacuo* at constant temperature is described. Diagrams, graphs, photograph, table. 13 ref.

11083 Note on Ultrasonic Absorption of Glass at Elevated Temperatures. B. L. Steierman, J. C. C. Wu, and J. M. McCormick. *American Ceramic Society, Journal,* v. 38, June 1955, p. 211-213.

Ultrasonic transmission properties of soda-lime glass at elevated temperatures were measured in the frequency range 0.25 to 1.0 Mc. Graphs, diagram. 4 ref.

11084 Preparation and Properties of Calcium Zirconate. M. R. Nadler and E. S. Fitzsimmons. *American Ceramic Society, Journal,* v. 38, June 1955, p. 214-217.

Includes table, graphs, micrographs. 13 ref.

11085 Glass Fibers With Oriented Chain Molecules. Martin Goldstein and T. H. Davies. *American Ceramic Society, Journal,* v. 38, July 1955, p. 223-226.

Includes photographs. 17 ref.

11086 Effect of Oxygen Content of Furnace Atmosphere on Adherence of Vitreous Coatings to Iron. A. G. Eubanks and D. G. Moore. *American Ceramic Society, Journal,* v. 38, July 1955, p. 226-230.

Use of porcelain enamel ground coats, with varying amounts of cobalt oxide, showed that optimum adherence necessitated increasing the oxide if the oxygen were decreased. A qualitative correlation was found between adherence and surface roughness, regardless of the oxygen content of the firing atmosphere. Photograph, diagram, graphs, tables, micrographs. 22 ref.

11087 Influence of Particle-Size Distribution on the Properties of Nepheline Syenite. C. J. Koenig. *American Ceramic Society, Journal,* v. 38, July 1955, p. 231-241.

Includes tables, graphs, micrographs, photographs, diagrams. 18 ref.

11088 Magnetic Ceramics. I. General Methods of Magnetic Ferrite Preparation. George Economos. *American Ceramic Society, Journal,* v. 38, July 1955, p. 241-244.

Various methods of preparing ferrospinels, with emphasis on the reactivity and homogeneity of the final mixture; use of controlled partial pressures of O_2 (CO_2-CO mixtures) for magnetite and manganese ferrite preparation. Graph, diagrams. 11 ref.

11089 Calcination of Calcite. I. Effect of Heating Rate and Temperature on Bulk Density of Calcium Oxide. H. F. Fischer. *American Ceramic Society, Journal,* v. 38, July 1955, p. 245-251.

Heating rate, during dissociation, had a definite bearing on densification. Shock heating conditions between 2200 and 2530 F gave abnormally low bulk density values. Tables, graphs, diagram. 7 ref.

Ceramics and Concrete

11090 Thermal Conductivity. XII. Temperature Dependence of Conductivity for Single-Phase Ceramics. W. D. Kingery. *American Ceramic Society, Journal*, v. 38, July 1955, p. 251-255.

Theoretical relationships and experimental data concerning thermal conductivity for a number of oxide materials were compared over a wide temperature range. Graphs. 12 ref.

11091* Improvement of Silica Brick by the Addition of Aluminum Orthophosphate. **Die Verbesserung von Silikasteinen durch Zusatz von Aluminium-Orthophosphat.** (German.) Gerhard Trömel and Karl-Heinz Obst. *Archiv für das Eisenhüttenwesen*, v. 26, no. 6, June 1955, p. 307-318.

Production of and relation between crystal structures of SiO_2 and $AlPO_4$; transformation of crystobalite. Graphs, micrographs, tables, X-ray diffraction pattern. 18 ref.

11092 Found: Flame-Resistant Coatings. *Chemical and Engineering News*, v. 33, June 20, 1955, p. 2608.

Oxides, applied by oxy-acetylene flame spray, resist temperatures to 3000 F; include a SiC coating for graphite.

11093* Recent Development in the Field of "Igurit". **Neuere Entwicklung auf dem Iguritgebiet.** (German.) W. Heyder and A. Bopp. *Chemische Technik*, v. 7, no. 5, May 1955, p. 249-252.

"Igurit" is an electrode graphite impregnated with suitable chemicals and temperature-resistant substances. Properties and uses in heat exchangers, tubes, and chemical equipment. Photographs. 2 ref.

11094 Gap-Graded Aggregates in Vibrated Concrete: Fundamental Studies of Relationships Governing Particle Interference. T. E. H. Williams. *Engineering*, v. 179, June 3, 1955, p. 693-698.

Analysis of the phenomenon of "particle interference" and the establishment of the principle governing the action of gap-graded aggregates in vibrated concrete. Diagrams, photographs, tables, graphs. 6 ref.

11095 Basic Refractories in the Glass Industry. James C. Hicks. *Glass Industry*, v. 36, June 1955, p. 313-315, 336-337.

Advantages of MgO refractories for checkers. Micrographs.

11096 Phase Equilibrium Studies of Steel Plant Refractories Systems. III. E. F. Osborn. *Industrial Heating*, v. 22, May 1955, p. 1039 + 7 pages.

Phase equilibrium relations of the system CaO-MgO-FeO-SiO_2. Diagrams, graphs, tables. 8 ref. (To be continued.)

11097* Translucency of Ceramic Ware. **La translucidité des pâtes céramiques.** (French.) *Industrie céramique*, 1955, no. 464, May, p. 117-123.

Translucency is studied as a factor in classifying ceramic pastes. Diagram, graphs. 7 ref.

11098 Refractories—1855 to 1955. *Iron Age (100th Anniversary Issue)*, v. 175, June 1955, p. 2J-8J.

New materials and applications in linings of furnaces and other equipment. Photographs.

11099 New Method Expands Slag for Aggregate Use. S. P. Kinney. *Iron and Steel Engineer*, v. 32, June 1955, p. 127-128.

Kinney-Osborne process for expanding blast-furnace slag for use as a light weight aggregate. Photographs, tables.

11100* Structure of Sodium-Borosilicate Glasses in Relation to the Phenomenon of Opalescence. **O strukture natrievoborosilikatnykh stekol v sviazi s iavleniem opalestsentsii. III.** Comparison of Results of the Investigation of Sodium-Borosilicate Glasses and the Porous Products of Their Leaching. **Sopostavlenie rezul'tatov issledovaniia natrievoborosilikatnykh stekol i poristykh produktov ikh vyshchelachivaniia.** (Russian.) E. A. Porai-Koshits, S. P. Zhdanov, and D. I. Levin. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1955, no. 3, May-June, p. 395-402.

Includes graphs. 28 ref.

11101 Carbon Bonded Silicon Carbide Crucibles Offer Outstanding Advantages. G. J. Easter. *Journal of Metals*, v. 7, July 1955, p. 805-810.

Crucibles can be put directly into a hot furnace without preannealing or preheating, a charge of cold metal can also be charged into the hot crucible and full heat applied without hesitation, and many other advantages are presented. Photographs, tables.

11102* Remarks on the Variation of Resistivity as a Function of the Temperature of Manganese- and Nickel-Oxide-Base Ceramics. **Remarques sur la variation de la résistivité en fonction de la température des céramiques a base d'oxydes de manganèse et de nickel.** (French.) J. Suchet. *Journal de physique et le radium*, v. 16, no. 5, May 1955, p. 417-422.

Study of preparation of above ceramics, showing an anomaly to the Wilson law under sintering conditions. Graphs. 14 ref.

11103* Special Ceramic Materials for Metallurgical Purposes. **Keramische Sonderwerkstoffe für metallurgische Zwecke.** (German.) G. Jaeger. *Metall*, v. 9, no. 9-10, May 1955, p. 358-366.

Review of production, properties, behavior, and uses of oxide, sulfide, carbide, nitride, and boride refractories. Tables, photographs. 41 ref.

11104* The Diamond and the Abrasive Industry. **Le diamant et l'industrie des abrasifs.** (French.) *Metallurgie et la construction mécanique*, v. 87, no. 5, May 1955, p. 409, 411, 413, 414.

Historical study; world diamond deposits and their exploitation. 2 ref.

11105 Influence of Grain-Size Distribution and Fluid-Energy Reduction on the Properties of Lakefield Nepheline Syenite. C. J. Koenig. *Ohio State University, Engineering Experiment Station, Bulletin No.* 156, v. 24, no. 2, May 1955, 29 p. (TA21 03b)

Includes diagrams, graphs, tables, photographs, micrographs.

11106* Hydraulic Cement Applications. H. Nye Josleyn. *Plant*, v. 11, June 1955, p. 45-47.

Adaptability in restoring deteriorated foundation walls, abutments, and other concrete structures in industrial plants. Photographs, diagrams.

11107* Transmission of Heat in the Rotary Cement Kiln. **La transmission de chaleur dans le four rotatif à ciment. III.** Measurements. **Les mesures.** (French.) Albert Folliot. *Revue des matériaux de construction, C*, 1955, no. 475, Apr., p. 99-116.

Use of thermocouples for measuring heat transfer and exchange. Photographs, diagrams, tables.

11108* Corrosion and Erosion of Ladle Bricks. Laboratory Testing Methods. **Corrosion et érosion des briques de poche. Méthodes d'essai au laboratoire.** (French.) Ph. Visseriat. *Silicates Industriels*, v. 20, no. 5, May 1955, p. 200-204.

Physico-chemical theory of corrosion of bricks by molten steel. Study of ladles from point of view of refractory coatings. Five testing methods.

11109* Schlieren Equipment and Schlieren Microscope for the Industrial Control of Glass Manufacture. **Schlierengerät und Schlierenmikroskop für die glastechnische Betriebskontrolle.** (German.) Wilhelm Rothe. *Silikattechnik*, v. 6, no. 4, Apr. 1955, p. 145-150, 164.

New device detects all types of optical defects in glasses and controls quality of plate glass. Diagrams, photographs, Schlieren micrographs. 13 ref.

11110* Investigation of the Properties of High-Silica Containing Glasses With Respect to the Ions Incorporated in the Glass and Their Position in the Periodic System. **Untersuchungen über die Eigneschaften hochkieselsäurehaltiger Gläser bezüglich der ins Glas eingebauten Ionen und deren Stellung im periodischen System der Elemente.** (German.) Klaus Kühne. *Silikattechnik*, v. 6, no. 5, May 1955, p. 190-200.

Studies of the specific effects of different ions on the silica lattice, electrical resistance, light refraction, and specific gravities of ultramicroporous glasses. Diagram, tables, graphs, photograph. 5 ref.

11111* Glaze Defects. **Glasurfehler.** (German.) Léon Schätzer. *Silikattechnik*, v. 6, no. 5, May 1955, p. 217-219.

Causes and methods of preventing settling in glazes; prevention of flaking and peeling; effects of firing variables. Tables. 8 ref.

11112* Computing the Expansion Coefficient of Glasses. **Zur Berechnung des Ausdehnungskoeffizienten von Gläsern.** (German.) Harry Kalsing. *Sprechsaal*, v. 88, no. 9, May 5, 1955, p. 193-195.

Includes tables. 8 ref.

11113* Slag Saturation by Capillary Action and Diffusion. **Schlackentränkung durch Kapillarwirkung und Diffusion.** (German.) Rudolf Rasch. *Sprechsaal*, v. 88, no. 11, June 5, 1955, p. 245-248.

Distinguishes between surface diffusion, boundary-plane diffusion, and lattice diffusion of slag in refractories. Effects of melting point of slag when dissolved in refractory material. Diagrams, graphs. 11 ref.

11114* Wear of Cutters With Mineral-Ceramic Disks. **Iznos reztsov s mineralokeramicheskimi plastinkami.** (Russian.) V. I. Zhikharev. *Stanki i Instrument*, v. 26, no. 5, May 1955, p. 14-16.

Factors affecting cutter life, such as density of grain packing and homogeneity of ceramic material; four classificatons derived, based on grain structure and size; wear of cutters in connection with machining of various steels, brass, Cu, etc. Micrographs, graphs.

11115 Preparation of Fused Clay Radiation Sources. I. Yttrium Macrospheres. William S. Ginell and Robert Doering. *U. S. Atomic Energy Commission, BNL-341*(T-60), June 1955, 5 p. (UF767 UN3.1bn)

A method for making macrospheres ranging in diameter from 600 to 1500 μ and containing the pure β-emitting isotope, Y-90. Photographs. 3 ref.

11116* Preparation of Casting Ladles for Tapping Steel Melts. **Przygotowanie kadzi odlewniczej do spustu wytopu stali.** (Polish.) Władysław Hansel. *Wiadomości Hutnicze*, v. 11, no. 2, Feb. 1955, p. 36-43.

Effects of operating variables on the life of ladle refractories; proper types and installation of refractory linings. Photographs, graphs, diagrams. 3 ref.

11117* Optical Stress Measurements on Glass-Metal Bonds at Higher Temperature. **Optische Spannungsmessungen an Glas-Metall-Verbindungen bei höheren Temperaturen.** (German.) Horst Herrmann. *Zeitschrift für angewandte Physik*, v. 7, no. 4, Apr. 1955, p. 174-176.

Special furnace-microscope arrangement to study stresses in glass-metal bonds under polarized light. Diagram, photograph, graphs. 3 ref.

11118* Electrical Conductivity of Glass. **Über die elektrische Leitfähigkeit des Glases. II.** The Conductivity of Li-Na, Na-K, K-Li Glasses. **Die Leitfähigkeit von Li-Na, Na-K, K-Li-Mischgläsern.** (German.) Béla Lengyel and Zoltán Boksay. *Zeitschrift für Physikalische Chemie (Leipzig)*, v. 204, nos. 3-4, May 1955, p. 157-164.

Determination of above as a function of alkalinity and temperature. Table, graph. 3 ref.

11119* X-Ray Investigation of Solid Solutions of $BaTiO_3$-$PbZrO_3$. **Rentgenograficheskoe issledovanie tverdykh rastvorov $BaTiO_3$-$PbZrO_3$.** (Russian.) E. A. Porai-Koshits, N. Ia. Karasik, and G. O. Gomon. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 5, May 1955, p. 945-946.

Variation of the lattice constants. Relation between seignetto-electrical properties and the "superstructure". Graph. 3 ref.

Books and Miscellaneous Publications

11120 Building Materials—Their Elasticity and Inelasticity. M. Reiner, editor. 560 p. 1954. Interscience Publishers, New York. (TA407 R27b)

Discusses the many diverse and complex materials that exhibit rheological properties and the way in which rheological knowledge has to be applied to a variety of problems of technical importance.

See also:

11165 (clay analysis)
11360 (effect of V_2O_5 on furnace linings)
11477 (semiconducting glazes)
11711 (use of slag in concrete)

CHEMICAL ENGINEERING

11121* Removing Sulfur From Gas by a Brief Selective Wash With Ammonia Solutions and Processing the Hydrogen Sulfide Into Sulfur or Ammonium Sulfate. **Gasentschwefelung durch Selektiv-Kurzwäsche mittels Ammoniaklösungen und Verarbeitung des Schwefelwasserstoffs auf Schwefel oder Ammonsulfat.** (German.) J. Bähr. *Brennstoff-Chemie*, v. 36, nos. 9-10, May 11, 1955, p. 129-142.

Principle and procedure of extracting S from coking gas with the usual means and equipment. Graphs, tables, photograph, diagrams. 27 ref.

11122 Solids-Liquid Separation. *Chemical Engineering*, v. 62, June 1955, p. 175-238.

A symposium of six papers. An eight-step approach to the problem is first presented, followed by papers on wet-screen, filter, centrifugal, thickener, and wet cyclone processes. Pictographic aids. 20 ref.

11123 Wet Cyclones. O. F. Tangel and R. J. Brison. *Chemical Engineering*, v. 62, June 1955, p. 234-238.

Usually used for classifying in the 5 to 150 μ range, device can serve as a thickener. Theory, designs, and applications. Diagrams, photographs. 16 ref.

11124 Chemical Engineering Fundamentals. Interpretation of Kinetic Data. III. Thomas E. Corrigan. *Chemical Engineering*, v. 62, June 1955, p. 253-256.

Mechanism rate equations for fluidized bed catalysis; examples. Tables, graphs. (To be continued.)

11125 New Wrinkle in Gaseous Diffusion. *Chemical Engineering*, v. 62, June 1955, p. 296-298.

Patented process combines mol. effusion and thermal diffusion. Diagram.

11126 Better Methanol Synthesis. *Chemical Engineering*, v. 62, June 1955, p. 370-373.

Increased capacity of Commercial Solvent Corp.'s Starlington, La. plant is explained. Photographs, flowsheet.

11127 Moving-Bed Processes. Raymond E. Vener. *Chemical Engineering*, v. 62, July 1955, p. 175-206.

Summary of commercial operations, fundamental principles of operation, engineering design, process, and possible new applications. Diagrams, graphs.

11128 Fluidize Then Carbonize. *Chemical and Engineering News*, v. 33, June 6, 1955, p. 2376, 2378.

New process yields about 25 gal. of liquid products per ton of fluidized coal, as well as char and gas. Flowsheet.

11129 Evaluating the Mechanical Design of End-Suction Centrifugal Pumps. Donald S. Ullock. *Chemical Engineering Progress*, v. 51, May 1955, p. 207-222.

Considers design requirements, pump maintenance, detection and correction of weak design, and advantages of standardized pump specifications. Tables, graphs, diagrams. 10 ref.

11130 The Role of Porosity in Filtration. II. Analytical Equations for Constant Rate Filtration. F. M. Tiller. *Chemical Engineering Progress*, v. 51, June 1955, p. 282-290.

Analytical equations for constant rate filtration operations by modification of the Kozeny equation. Tables, diagram, graphs. 14 ref.

11131* Centrifuging. II. Applications in the Chemical, Brewing and Fermentation, Petroleum and Other Industries; Auxiliary Apparatus. E. Broadwell. *Chemical and Process Engineering*, v. 36, May 1955, p. 165-167.

Includes photographs. 129 ref.

Chemical Engineering

11132* The Production of Fresh Water From Salt or Brackish Water. J. Leicester. *Chemical & Process Engineering*, v. 36, May 1955, p. 171-174.

Conventional apparatus, scale formation, and foam control are covered. Table, diagrams. (To be continued.)

11133* Calcium Cyanamide as a Raw Material for Chemical Products. **Kalkstickstoff als Ausgangsstoff für chemische Erzeugnisse.** (German.) Kurt Leicht. *Chemiker-Zeitung*, v. 79, no. 9, May 5, 1955, p. 290-294.

Production of carbides; possibilities and processes of azotizing calcium carbides. Diagram. 6 ref.

11134 Adsorption as an Engineering Tool. II. C. L. Mantell. *Chemistry in Canada*, v. 7, June 1955, p. 60, 62, 66, 68.

Applications, especially in oil and gas technology. Photographs. 11 ref.

11135 Silicones as Engineering Materials: Electrical, Mechanical and Chemical Applications. L. P. Smith. *Engineering*, v. 179, June 24, 1955, p. 789-792.

Includes photographs, tables, graph. 9 ref.

11136 Batch Fractional Solvent Extraction With Reflux. D. E. Weiss. *Industrial Chemist and Chemical Manufacturer*, v. 31, May 1955, p. 230-232.

Process, analogous to batch fractional distillation, separates complex mixtures of weak electrolytes. Graph, flowsheets. 7 ref.

11137 Hydraulic Conveying of Solids in Horizontal Pipes. *Industrial Chemist and Chemical Manufacturer*, v. 31, May 1955, p. 241-244.

Extends earlier work where particles up to 1-in. diameter in concentrations up to 22% are studied in pipes from 1.5 to 22-in. in diameter.

11138 Pulsatory and Vibrational Phenomena. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1152-1184.

A symposium of 15 papers covering pulsation power requirements, liquid-liquid extraction, ultrasonics in liquid-solid extraction, granular solid flow, convective heat transfer, chemical effects, steel, isotopic separations by ultrasonics, flame, and explosion phenomena.

11139 Fractionation of Water-Soluble Acids Obtained by Alkali-Oxygen Oxidation of Coal. R. S. Montgomery and P. J. Sienknecht. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1274-1276.

Feasible separation of these aromatic acids is described. Tables, graphs. 5 ref.

11140* Refining of Motor Oil by Means of Cresol. **Motorolaj finomításá krezollal.** (Hungarian.) Endre Vámos and Pál Zakar. *Magyar Kémikusok Lapja*, v. 10, no. 5, May 1955, p. 144-149.

Development of a continuous refining process. Diagrams, graphs, tables. 8 ref.

11141* The Chemistry of Water Coagulation. A. P. Black. *Water & Sewage Works (Reference and Data Edition)*, v. 102, June 1, 1955, p. 99R, 101R, 103R-104R.

Colloids, their classification and properties; methods of precipitating colloids; mechanism of coagulation and floc formation; influence of other ions present in water; coagulants used in water treatment; laboratory control of coagulation.

Books and Miscellaneous Publications

11142* The Science of Petroleum. v. V, Pt. III. Refinery Products. Benjamin T. Brooks and A. E. Dunstan, editors. 397 p. 1955. Oxford University Press, New York. (TN870 D92s)

Twenty-three papers concerning the latest advances in the field of refinery products. Subjects range from the manufacture and testing of aviation fuels to Raman spectroscopy.

11143 Joint Symposium on Future of Aromatic Hydrocarbons. 77 p. 1955. American Chemical Society, Washington, D. C. (QD341.H9 Am35j)

A symposium of eight papers on methods of manufacturing aromatics and their uses in chemical industry.

See also:

11226 (fatty acid extraction)
11579 (data searching in chemical libraries)

CHEMISTRY—ANALYTICAL AND INORGANIC

11144* Studies of Absorption Spectra. IX. The Spectra of Cobalt(II) Complexes. (English.) C. J. Ballhausen and Chr. Klixbüll Jørgensen. *Acta Chemica Scandinavica*, v. 9, no. 3, 1955, p. 397-404.

Hexammine and tris(ethylenediamine) Co(II) ions were examined while free of colored oxidation products. Table, ultraviolet spectrum. 26 ref.

11145* The Photometric Determination of Titanium in Pure Aluminum With Sulfosalicylic Acid. **Die photometrische Bestimmung des Titans mit Sulfosalicylsäure in Reinaluminium.** (German.) E. Steuer and H. Dunkel. *Aluminium*, v. 31, no. 5, May 1955, p. 205-207.

Includes graphs, tables.

11146* Photometric Determination of Iron in Pure Aluminum With o-Phenanthroline and Its Applicability to Other Non-Ferrous Metals. **Die photometrische Eisenbestimmung mit o-Phenanthrolin in Reinaluminium und ihre Überprüfung zur Bestimmung in anderen Nichteisenmetallen.** (German.) Heinz Pohl. *Aluminium*, v. 31, no. 5, May 1955, p. 207-210.

Experimental determination of Fe in Al, light-metal alloys, Sn, and soft Pb with an accuracy of 0.35 to 1%; effect of accompanying elements; comparison of results obtained with different photometers. Tables, graph. 6 ref.

11147* Spectrometric Analysis of Aluminum Alloys. **Spektrometrische Analysen von Aluminiumlegierungen.** (German.) Ch. Burkhardt. *Aluminium*, v. 31, no. 6, June 1955, p. 282-286.

An automatically operating spectrograph with direct evaluation of the spectrum. Photographs, diagrams, graphs, tables. 6 ref.

11148 The Vacuum Ultraviolet Absorption Spectrum of Difluoromethane. Paul Wagner and A. B. F. Duncan. *American Chemical Society, Journal*, v. 77, May 5, 1955, p. 2609-2610.

Four resolved electronic transitions are found between 535 and 2200 A. Table, ultra-violet spectra. 6 ref.

11149 The Preparation and Some Properties of Magnesium Hydride. F. H. Ellinger, C. E. Holley, Jr., B. B. McInteer, D. Pavone, R. M. Potter, E. Staritzky, and W. H. Zachariasen. *American Chemical Society, Journal*, v. 77, May 5, 1955, p. 2647-2648.

Prepared by direct reaction with H up to 1000 psi. and from 300 to 500 C. Graphs. 2 ref.

11150 The Dissociation of Iron Pentacarbonyl in Certain Amines. Heinz W. Sternberg, Robert A. Friedel, S. Leonard Shufler, and Irving Wender. *American Chemical Society, Journal*, v. 77, May 20, 1955, p. 2675-2677.

Effect of amines on $[Fe(CO)_6]^{++}$ and $[Fe(CO)_4]^-$ ions. Tables. 19 ref.

11151 Studies on the Raschig Synthesis of Hydrazine. The Reaction Between Aqueous Chloramine and Ammonia Solutions. Mark M. Jones, L. F. Audrieth, and Ervin Colton. *American Chemical Society, Journal*, v. 77, May 20, 1955, p. 2701-2703.

Addition of NaOH increases hydrazine yield. Graphs. 10 ref.

11152 Synthesis of Anhydrous Metal Halides. George W. Watt, Philip S. Gentile, and E. P. Helvenston. *American Chemical Society, Journal*, v. 77, May 20, 1955, p. 2752-2753.

By reaction of hydrated metal acetate and acetyl halide in benzene. Table. 2 ref.

11153* The Quantitative Determination of Potassium as the Tetraphenylboron Salt. K. Sporek and A. F. Williams. *Analyst*, v. 80, May 1955, p. 347-354.

Procedures are critically reviewed; optimum conditions determined. Tables. 14 ref.

11154* The Determination of Niobium or Tantalum in Uranium and Zirconium-Base Alloys. G. W. C. Milner, G. A. Barnett, and A. A. Smales. *Analyst*, v. 80, May 1955, p. 380-390.

Methyl *iso*butyl ketone is solvent for Nb and Ta. Tables. 8 ref.

11155* Coulometric Argentometry. Quantitative Determination of Chlorine, Bromine, and Iodine Ions. **Coulometrische Argentometrie. Quantitative Bestimmung von Chlor-, Brom- und Jodionen.** (German.) Panta S. Tutundžić, Ivan Doroslovački, and Ozra Tatić. *Analytica Chimica Acta*, v. 12, no. 5, May 1955, p. 481-488.

Determination of halides with electrolytically generated Ag ions. Tables. 16 ref.

11156 Polarographic Determination of Copper, Nickel, Cobalt, Manganese, and Chromium in Titanium Alloys. James J. Mikula and Maurice Codell. *Analytical Chemistry*, v. 27, May 1955, p. 729-732.

Method suitable for determining 0.2 to 5.0% Cu, Ni, or Co in presence of each other, 1 to 10% Mn, and 0.05 to 20% Cr from a 0.1g. sample. Tables, graphs. 19 ref.

11157 Spectrographic Analysis of Briquetted Unashed Plant Material. J. H. Muntz and S. W. Melsted. *Analytical Chemistry*, v. 27, May 1955, p. 751-753.

Finely ground material is mixed with Li_2CO_3 and graphite. Accuracy is about ± 20%. Tables. 8 ref.

11158 Determination of Carbon in Sodium-Potassium Alloy. K. G. Stoffer and J. H. Phillips. *Analytical Chemistry*, v. 27, May 1955, p. 773-776.

The C content of NaK is critical for it carburizes and weakens stainless steel. A microcombustion process and special devices are described. Table, diagrams, photographs. 7 ref.

11159 Activation Analysis of Trace Impurities in Silicon Using Scintillation Spectrometry. George H. Morrison and James F. Cosgrove. *Analytical Chemistry*, v. 27, May 1955, p. 810-813.

Sensitivity of 0.001 to 1 γ is attained for most elements using this technique. Tables, diagram, photograph. 9 ref.

11160 Determination of Microgram and Submicrogram Quantities of Uranium by Neutron Activation Analysis. H. A. Mahlman and G. W. Leddicotte. *Analytical Chemistry*, v. 27, May 1955, p. 823-825.

Will measure U concentration of 0.1 γ per g. with ± 10% accuracy; detects 0.0001 γ per g. Tables. 9 ref.

11161* Contribution to the Study of Organic Peroxides by Polarography. **Contribution a l'étude des peroxydes organiques par polarographie.** (French.) M.-L.-J. Bernard. *Annales de Chimie (Paris)*, v. 19, Mar.-Apr. 1955, p. 315-352.

Experimental conditions, polarography in non-aqueous and aqueous media, theoretical study, and applications. Graphs, tables. 23 ref.

11162* Optical Methods of Determining Trace Elements by Concentration. **Optische Verfahren zur Bestimmung von Spurenelementen durch Anreicherung.** (German.) Hermann Specker. *Archiv für das Eisenhüttenwesen*, v. 26, no. 5, May 1955, p. 267-269; disc., p. 269-270.

Discusses the methods of concentrations and photometric analysis of trace elements in metals and soils. Graph, table. 4 ref.

11163* Rapid Nephelometric Determination of Copper. **Nephelometrische Kupfer-Schnellbestimmung.** (German.) Wilhelm Denck and Carl Mahr. *Archiv für das Eisenhüttenwesen*, v. 26, no. 5, May 1955, p. 271-274.

Review of recent literature; analytical procedures; effects of experimental conditions and disturbing components; possibility of densiometric measurement of suspensions. Graphs, diagram, tables. 5 ref.

11164* Analysis of Pig and Cast Iron by Residue. **Zur Rückstandsanalyse von Roheisen und Gusseisen. I.** Electrolysis. **Elektrolyse.** (German.) Adalbert Wittmoser and Hans Bockshammer. *Archiv für das Eisenhüttenwesen*, v. 26, no. 6, June 1955, p. 319-328.

Includes micrographs, tables, graphs, diagrams. 52 ref.

11165* Spectrometric Investigation of Clay and Schamotte. **Spektrochemische Bestimmungen an Tonen und Schamotten.** (German.) Gerhard Hartleif and Heinz Kornfeld. *Archiv für das Eisenhüttenwesen*, v. 26, no. 6, June 1955, p. 329-332.

Three methods of determining alumina, titanic acid, iron oxide, lime, and magnesia; advantages and disadvantages of individual methods. Diagrams, tables, graphs. 5 ref.

11166* Supplement to the Photometric Determination of Molybdenum in Steel. **Beitrag zur photometrischen Bestimmung des Molybdäns im Stahl.** (German.) Johannes Bünger. *Archiv für das Eisenhüttenwesen*, v. 26, no. 6, June 1955, p. 333-335.

Includes tables, graphs. 11 ref.

11167 Photometric Method for Manganese, Chromium, Tungsten, Nickel, Vanadium, Molybdenum, Cobalt and Copper on One Sample. S. Gregorczyk. *Henry Brutcher Translation No.* 3471, 14 p. (Abridged from *Hutnik*, v. 20, no. 4, 1953, p. 140-145.) Henry Brutcher, Altadena, Calif.

Determination of various alloying elements in steel on a single sample, based on photometric extinction of different colors, caused either by MnO_4^- or by complex compounds. Diagrams, tables. 2 ref.

11168 Spectroanalysis of Phosphorus in Steel. E. S. Kudelya and A. S. Dem'yanchuk. *Henry Brutcher Translation No.* 3520, 4 p. (From *Doklady Akademii Nauk SSSR*, v. 83, no. 3, 1952, p. 397-398.) Henry Brutcher, Altadena, Calif.

Review of literature data and drawbacks of present spectroanalytical methods for P in Fe and steel; development of a rapid method based on the visible part of the spectrum. Photographs, table. 5 ref.

11169 Titrations in Anhydrous Solvents. I. Theoretical Survey. T. S. West. *Chemical Age*, v. 72, May 21, 1955, p. 1143-1147.

Solvent selection and indicators. 32 ref. (To be continued.)

11170* Studies on A.C. Polarography. I. Theoretical Treatment. II. Fundamental Circuit and Some Experimental Results. III. Reversible Wave. IV. Reversible Behaviour of Anions. (English.) Isamu Tachi, Tomihito Kambara, Mitsugi Senda, Mitsuko Okuda, and Yoshio Takemori. *Chemical Society of Japan, Bulletin*, v. 28, no. 1, Jan. 1955, p. 25-41; v. 28, no. 3, Apr. 1955, p. 151-156.

Includes table, graphs, diagrams, circuit diagrams, polarograms. 47 ref.

11171* A Rapid Determination of Nitrogen in Organic Compounds by the Iodic Acid Decomposition Method. (English.) Shigeru Ohashi. *Chemical Society of Japan, Bulletin*, v. 28, no. 3, Apr. 1955, p. 177-181.

In 24 compounds analyzed, deviations of ± 3% resulted on samples > 50 mg. Tables, diagram. 2 ref.

11172* Spectrochemical Study of Microscopic Crystals. VII. Absorption Spectra of Trans-Dihalogeno-Bis (Ethylenediamine)-Cobalt (III) Complexes. (English.) Soichiro Yamada, Akitsugu Nakahara, Yoichi Shimura, and Ryutaro Tsuchida. *Chemical Society of Japan, Bulletin*, v. 28, no. 3, Apr. 1955, p. 222-227.

Discusses absorption spectra of several praseo-complexes in solution. Tables, ultra-violet spectra. 14 ref.

11173 Improvement of End Point in EDTA Titrations Through Use of Manganous Salts. Jorma Kinnunen and Bertil Wennerstrand. *Chemist-Analyst*, v. 44, June 1955, p. 33-34.

Involves using an excess of EDTA and back-titrating with a standardized manganous salt. 2 ref.

11174 Improved Test for Formaldehyde. F. Feigl and L. Hainberger. *Chemist-Analyst*, v. 44, June 1955, p. 47-48.

Key is a procedure to keep the reaction dry. 5 ref.

11175 The Pressed-Disk Technique in Infra-Red Spectroscopy. V. C. Farmer. *Chemistry & Industry*, 1955, no. 21, May 21, p. 586-587.

Discs of KCl and KBr with benzoic acid are compared. Method is not dependable for organic compounds having OH groups. Infra-red spectra. 5 ref.

11176 The Use of Polythene in the Separation of Fatty Acids by Reverse-Phase Chromatography. T. Green, F. O. Howitt, and R. Preston. *Chemistry & Industry*, 1955, no. 21, May 21, p. 591-592.

Chemistry—Analytical and Inorganic

Numerous acids from C_8 to C_{30} were successfully isolated. Graphs. 2 ref.

11177* Colorimetric Analysis in the Heteropolyacid Series. **L'analyse colorimétrique dans la série des hétéropolyacides.** (French.) M. Jean. *Chimie Analytique*, v. 37, no. 5, May 1955, p. 163-172.

Determination of molybdic heteropolyacids and of the V complexes of molybdic and tungstic heteropolyacids. Tables, graph. 337 ref.

11178* Control and Perfecting of a New Method for the Determination of Ta and Nb. **Contrôle et mise au point d'une nouvelle méthode pour le dosage du tantale et du niobium.** (French.) B. Emile Jaboulay. *Chimie Analytique*, v. 37, no. 6, June 1955, p. 198-200.

Tantalic acid precipitates with HCl and H_2O_2, while niobic acid remains in solution.

11179* Determination of Boron in Steels. **Contribution au dosage du bore dans les aciers.** (French.) L. Lenard and Ch. Dussart. *Chimie Analytique*, v. 37, no. 6, June 1955, p. 207-211.

Difficulties in colorimetric determination using quinalizarin and boric acid reactions are discussed. Table, graph. 2 ref.

11180* Improved Methods of Analysis for Oxygen, Carbon Monoxide, and Iron on Fingertip Blood. Samuel Natelson and Carol M. Menning. *Clinical Chemistry*, v. 1, June 1955, p. 165-179.

A microgasometric method using 0.1 ml. sample. Photographs. 22 ref.

11181* Chromatographic Semi-Microanalysis of Gases. **Khromatograficheskii polumikroanaliz gazov. VIII.** Analysis of Dissolved Gases. **Analiz rastvorennykh gazov. IX.** The Determination of Nitrous Oxide. **Die Bestimmung von Stickoxydul. X.** Determination of Small Quantities and Traces of Helium, Together With Neon, and of Hydrogen in Gases. **Die Bestimmung kleiner Mengen bis Spuren von Helium mit Neon und von Wasserstoff in Gasen.** (Russian and German.) J. Janák, I. Páralová, M. Rusek, and M. Tesařík. *Collection of Czechoslovak Chemical Communications*, v. 20, no. 2, Apr. 1955, p. 336-355.

Includes diagrams, tables, graphs. 41 ref.

11182* Determination of Aluminum in Alloyed Steels (Cryolite Method) According to J. W. Tananajew and P. H. Jakowlew. **Bestimmung von Aluminium in legierten Stählen (Kryolithmethode) nach J. W. Tananajew und P. H. Jakowlew.** (German.) Rudolf Leo and Gertrud König. *Giessereitechnik*, v. 1, no. 3, Mar. 1955, p. 26-28.

Rapid and accurate method of determining Al contents of 0.05-10%. Tables. 3 ref.

11183* Contribution to the Study of Gas Solutions by Infra-Red Spectroscopy. **Contribution a l'étude des solutions de gaz par spectrographie infrarouge.** (French.) G. Paillard. *Journal de physique et le radium*, v. 16, no. 4, Apr. 1955, p. 281-285.

Comparison of absorption spectra of methane and ethylene dissolved in CCl_4 and CS_2 shows: hindering of rotation by mol. interactions and disappearance of fine structure in solution; displacement of vibration bands and harmonic vibrations. Tables, graphs. 18 ref.

11184* Rapid Determination of the Sodium Content of Cryolite and the Cryolite Bath. **Kriolit és kriolitfürdő nátriumtartalmának gyors meghatározása.** (Hungarian.) Györgyné Posgay. *Kohászati Lapok*, v. 10, no. 5, May 1955, p. 231-232.

Electrodialytic method applied after elimination of F. Table. 8 ref.

11185* Infra-Red Spectroscopy of Molecules Adsorbed on Porous Glass. **Spectroscopie infrarouge des molécules adsorbées sur verre poreux.** (French.) A. N. Terenin, N. G. Jaroslavsky, A. W. Karjakin, and A. I. Sidorova. *Mikrochimica Acta*, 1955, nos. 2-3, p. 467-470.

Spectral analysis of adsorbed vapors on scrupulously cleaned discs is reported. 4 ref.

11186* A New Physical Method of Analysis: Radio Frequency Spectroscopy. **Eine neue physikalische Analysenmethode: Radiofrequenz-spektroskopie.** (German.) Werner Brügel. *Umschau in Wissenschaft und Technik*, v. 55, no. 11, June 1, 1955, p. 324-327.

Explains the Larmar frequency of nuclear spin, formation of a R. F. spectrum, and its use in chemical analysis. Diagrams, graphs, table.

11187* Contributions to the Chemistry of Nb and Ta. **Beiträge zur Chemie der Elemente Niob und Tantal. XV.** Spectroanalytical Determination of Small Tin Contents in Pentavalent Niobium-Oxide Specimens. **Die spektralanalytische Bestimmung kleiner Zinngehalte in Niob (V)-oxyd-Präparaten.** (German.) Gottfried Holdt and Harald Schäfer. *Zeitschrift für analytische Chemie*, v. 146, no. 1, 1955, p. 4-11.

Reactions between oxide samples with varying Sn content and the C electrode. Diagrams, graphs, photograph, table. 8 ref.

11188* Rapid Titrimetric Determination of the Total Sulfur in Pyrites, Furnace Slags, and Fly Dusts With Benzidine. **Beitrag zur titrimetrischen Schnellbestimmung des Gesamtschwefels in Kiesen, Abbränden und Flugstäuben mit Benzidin.** (German.) Ernst Eberius and Ernst Jahn. *Zeitschrift für analytische Chemie*, v. 146, no. 2, 1955, p. 81-87.

Specifications on above method and procedure for recovering the benzidine. Diagram, tables. 8 ref.

11189* Application of Ion Exchangers in Analytical Chemistry. **Anwendung von Ionenaustauschern in der analytischen Chemie. III.** The Elution Constants of Different Elements in Hydrochloric Acid Solution. **Die Elutionskonstanten verschiedener Elemente in salzsaurer Lösung.** (German.) D. Jentzsch and I. Pawlik. *Zeitschrift für analytische Chemie*, v. 146, no. 2, 1955, p. 88-102.

Quantitative measurement of elution constants of 12.5 to 0.1 *M* HCl for Pb, Fe, In, Cu, Sn, and Zn; discusses strength and cross section of column, concentrations, flow rate, and temperature on elution constants. Tables, graphs. 6 ref.

11190* Sulfur-Nitrogen-Fluorine Compounds. **Schwefel-Stickstoff-Fluorverbindungen. I.** Preparation and Properties of $S_4N_4F_4$, SN_2F_2, and SNF. **Darstellung und Eigenschaften von $S_4N_4F_4$, SN_2F_2 und SNF.** (German.) Oskar Glemser, Hans Schröder, and Harke Haeseler. *Zeitschrift für anorganische und allgemeine Chemie*, v. 279, nos. 1-2, Mar. 1955, p. 28-37.

Includes graphs, tables, diagrams. 16 ref.

11191* Preparation and Thermal Stability of the Magnesium Carbides: MgC_2 and Mg_2C_3. **Zur Darstellung und thermischen Stabilität der Magnesiumcarbide MgC_2 und Mg_2C_3.** (German.) A. Schneider and J. F. Cordes. *Zeitschrift für anorganische und allgemeine Chemie*, v. 279, nos. 1-2, Mar. 1955, p. 94-103.

Includes graphs, table. 18 ref.

11192* Methods of Determining Mercury in Ores and Smeltery Products. **Methoden zur Quecksilberbestimmung in Erzen und Hüttenprodukten.** (German.) H. Dreyer and O. Lessmann. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 8, no. 5, May 1955, p. 236-240.

Critical examination of the Eschka method and specifications for the dithiazone and distillation methods. Tables. 11 ref.

Books and Miscellaneous Publications

11193 Symposium on Spectroscopy in the Petroleum Industry. 103 p. 1955. American Chemical Society, Washington, D. C. (TP691 Am34.8s)

A symposium of ten papers covering infra-red, Raman, ultraviolet and emission spectroscopy; mass spectrometry; microwaves; magnetic resonance; electron waves; and X-rays in petroleum technology.

See also:

11215 (separation of carboxylic acids)
11727 (spectrographic analysis of magnesium alloys)
12309 (identification of air pollutants)
12310 (identification of petroleum refinery wastes)

CHEMISTRY—ORGANIC

11194 The Degradation of Collagen. II. The Solubilization Process in the Acid *p*H Range. III. Characterization of Soluble Products of Mild Acid Degradation. Arthur Veis, Delbert N. Eggenberger, and Jerome Cohen. *American Chemical Society, Journal,* v. 77, May 5, 1955, p. 2364-2374.

Includes tables, graphs. 39 ref.

11195 Lignin. IV. Electrophoresis Study of Alkaline Cleavage Products From Lignin Sulfonates. V. Vanilloylformic Acid From Alkaline Cleavage of Lignin Sulfonates. R. E. Davis, E. T. Reaville, Q. P. Peniston, Joseph L. McCarthy, D. W. Glennie, and H. Techlenberg. *American Chemical Society, Journal,* v. 77, May 5, 1955, p. 2405-2412.

Sulfonates from hemlock, spruce, and Douglas fir studied; vanilloylformic acid is isolated. Tables, ultra-violet spectra, electrophoretograms. 32 ref.

11196 The Alkaline Oxidation of 2-Naphthol. Gosta Brunnstrom. *American Chemical Society, Journal,* v. 77, May 5, 1955, p. 2463-2465.

Action of air produced the new compound, dinaphtho [2,1,1′,2′] furan-5,6-dione. 11 ref.

11197 Aliphatic Organo-Functional Siloxanes. III. Synthesis and Physical Properties of Organopolysiloxane Diesters. L. H. Sommer, W. D. English, G. R. Ansul, and D. N. Vivona. *American Chemical Society, Journal,* v. 77, May 5, 1955, p. 2485-2489.

Organic ester end groups do not jeopardize organosiloxane properties of the main chain. Tables. 16 ref.

11198 Organoboron Compounds. V. The Preparation of an Unsymmetrical Diarylborinate. IV. Aminoethyl Diarylborinates. Robert L. Letsinger, Nathaniel Remes, and Ivan Skoog. *American Chemical Society, Journal,* v. 77, May 5, 1955, p. 2489-2494.

Includes tables. 12 ref.

11199 Organic Peroxides. XX. Peroxides From the Ozonization of Olefins in the Presence of Carbonium Ions. Nicholas A. Milas, Pauls Davis, and John T. Nolan, Jr. *American Chemical Society, Journal,* v. 77, May 5, 1955, p. 2536-2541.

Includes tables, graph, diagram. 24 ref.

11200 Removal of Peroxides From Ethers With Cerous Hydroxide. J. B. Ramsey and F. T. Aldridge. *American Chemical Society, Journal,* v. 77, May 5, 1955, p. 2561-2562.

Shows that $Ce(OH)_3$ is a safe, insoluble reactant for peroxides. 4 ref.

11201 Halogen-Silver Complexes of the Fluorocarbon Carboxylic Acids. G. H. Crawford and J. H. Simons. *American Chemical Society, Journal,* v. 77, May 5, 1955, p. 2605-2608.

Room temperature preparation, identification, and reactions. Tables. 29 ref.

11202 Free Radical Additions Involving Fluorine Compounds. IV. The Addition of Dibromodifluoromethane to Some Fluoroölefins. Paul Tarrant, Alan M. Lovelace, and Marvin R. Lilyquist. *American Chemical Society, Journal,* v. 77, May 20, 1955, p. 2783-2787.

Products have been converted to olefins, dienes, and cyclic compounds. Tables. 17 ref.

11203 Phenylmaleonitrile and Phenylfumaronitrile. A New Reaction Observed on Activated Alumina. D. W. Hein. *American Chemical Society, Journal,* v. 77, May 20, 1955, p. 2797-2800.

Obtained in 75 to 85% over-all yields from α-cyanophenylacetaldehyde; isomers are easily separated. 15 ref.

11204 Highly Branched Molecules. II. The Chlorides From Tri-*t*-Butylcarbinol and Its Lower Homologs. III. The Preparation of Tri-*t*-Butylcarbinol by Means of *t*-Butyllithium. IV. Solvolysis of the *p*-Nitrobenzoate of Tri-*t*-Butylcarbinol and Some of Its Homologs. Paul D. Bartlett, Marguerite S. Swain, Edwin B. Lefferts, and Martin Stiles. *American Chemical Society, Journal,* v. 77, May 20, 1955, p. 2801-2814.

Includes tables. 62 ref.

11205 The Isolation of a New Resin Acid From Gum Rosin—Palustric Acid. Virginia M. Loeblich, Doris E. Baldwin, and Ray V. Lawrence. *American Chemical Society, Journal,* v. 77, May 20, 1955, p. 2823-2825.

An isomer of levopimaric and abietic acids isolated by chromatography. Tables, infra-red spectra, chromatogram. 14 ref.

11206 Nitrobenzene Oxidation of Lignin Model Compounds, Spruce Wood and Spruce "Native Lignin". John C. Pew. *American Chemical Society, Journal,* v. 77, May 20, 1955, p. 2831-2833.

Shows that spruce wood lignin and Braun's spruce "native lignin" are very similar. Table. 9 ref.

11207 Some *meso*-Substituted Anthracenes. I. 9,10-Bis-(Chloromethyl)-Anthracene as a Synthetic Intermediate. Max W. Miller, Roger W. Amidon, and Pliny O. Tawney. *American Chemical Society, Journal,* v. 77, May 20, 1955, p. 2845-2848.

Includes table. 8 ref.

11208 On the Cleavage of Benzene, Thiophene and Furan Rings by Means of Ultrasonic Waves. L. Zechmeister and L. Wallcave. *American Chemical Society, Journal,* v. 77, May 20, 1955, p. 2853-2855.

Treated suspensions in aqueous $AgNO_3$ precipitated Ag halides and sulfides with some AgC_2H and Ag_2C_2. Table. 14 ref.

11209 Trichloromethylphosphonic Acid. Irving S. Bengelsdorf and Leonidas B. Barron. *American Chemical Society, Journal,* v. 77, May 20, 1955, p. 2869-2871.

Made by acidic hydrolysis of the esters. Table. 9 ref.

11210 Preparation of Organomagnesium Compounds of Substituted Silicon Esters. Sanders D. Rosenberg and Eugene G. Rochow. *American Chemical Society, Journal,* v. 77, May 20, 1955, p. 2907-2908.

Methyl-*p*-bromophenyl di-*o*-cresoxysilane, used for a stable Grignard reagent, gave a 41% yield. 1 ref.

11211 Hydrogen Fluoride as a Condensing Agent. V. Reactions of Dicyclopentadienyliron in Anhydrous Hydrogen Fluoride. Viktor Weinmayr. *American Chemical Society, Journal,* v. 77, June 5, 1955, p. 3009-3011.

Includes table. 5 ref.

11212 Carbonium Ions. I. An Acidity Function (C_0) Derived From Arylcarbonium Ion Equilibria. II. Linear Free Energy Relationships in Arylcarbonium Ion Equilibria. N. C. Deno, J. J. Jaruzelski, and Alan Schriesheim. *American Chemical Society, Journal,* v. 77, June 5, 1955, p. 3044-3054.

Includes tables. 36 ref.

11213 The Direct Preparation of Benzyllithium. Henry Gilman and Richard D. Gorsich. *American Chemical Society, Journal,* v. 77, June 5, 1955, p. 3134-3135.

Benzylchloride in dioxane is carefully reacted with Li ribbon. Table. 9 ref.

11214 21st Annual Review of the Literature on Fats, Oils, and Detergents. II. *American Oil Chemists' Society, Journal,* v. 32, June 1955, p. 319-341.

Covers nutrition and biochemistry; characteristics and composition; and detergents. Table.

11215 New Solvent System for Separating Monocarboxylic Acids (C_2 to C_{10}) and Dicarboxylic Acids (C_2 to C_{22}). Vladimir Zbinovsky. *Analytical Chemistry,* v. 27, May 1955, p. 764-769.

Solvent systems are: methyl Cellosolve-water (internal phase), and Skellysolve B, or *n*-butyl ether, or their mixtures (external phase). Silicic acid columns were developed. Tables, graphs, diagram. 10 ref.

11216* Oxidation of Abietic Acid by Mercuric Acetate. Derivatives of Substituted Dehydroabietic Acid in Cycle B. **Oxydation de l'acide abiétique par l'acétate mercurique. Dérivés de l'acide déhydroabiétique substitués dans le cycle B.** (French.) Georges Dupont, Raymond Dulou, Guy Ourisson, and Claude Thibault. *Bulletin de la société chimique de France,* 1955, no. 5, May, p. 708-715.

Includes graphs, diagrams. 16 ref.

Chemistry—Organic

11217 The Photolysis of Methyl Ethyl Ketone. P. Ausloos and E. W. R. Steacie. *Canadian Journal of Chemistry*, v. 33, June 1955, p. 1062-1068.

Photolyzed from 25 to 240 C, with and without azomethane. Tables, graphs. 14 ref.

11218* Studies on Unsaturated Organosilicon Compounds. II. Reactions and Properties of Vinyltrimethylsilane. (English.) Motonori Kanazashi. *Chemical Society of Japan, Bulletin*, v. 28, no. 1, Jan. 1955, p. 44-50.

Additions to and polymerization of vinyltrimethylsilane; acid cleavage of the vinyl-silicon bond. Tables, photographs. 31 ref.

11219* Two Simple Cyclic Peroxides. **Zwei einfache cyclishe Peroxyde.** (German.) Rudolf Criegee and Gerhard Paulig. *Chemische Berichte*, v. 88, no. 5, 1955, p. 712-716.

Preparation of tetramethyl-dioxa-cyclopentane (III) and tetramethyl-dioxa-cyclohexane (VI); infra-red spectroanalyses. Graph, diagrams. 12 ref.

11220* Formation of Malonic Acid From Butyne-Diol and Peracetic Acid. **Über die Bildung von Malonsäure aus Butindiol und Peressigsäure.** (German.) Volker Franzen. *Chemische Berichte*, v. 88, no. 5, 1955, p. 717-724.

Includes table, spectrograms. 7 ref.

11221* Organic Aluminum Compounds. **Zur Kenntnis aluminium-organischer Verbindungen.** (German.) Eckhard Bonitz. *Chemische Berichte*, v. 88, no. 6, 1955, p. 742-763.

Determination of Al alkyls, dialkyl-aluminum hydrides, and dialkyl-aluminum halides by spectrochemical and volumetric analysis; measurement of heats of miscibility; conductimetric and potentiometric titration. Graphs, tables, diagrams, ultraviolet spectra. 34 ref.

11222 The Photolysis of Hexafluoroazomethane and the Reactions of CF_3 Radicals With Methane and *n*-Butane. G. O. Pritchard, H. O. Pritchard, and A. F. Trotman-Dickenson. *Chemistry & Industry*, 1955, no. 20, May 14, p. 564.

Made by heating ICN with IF_3 in a steel bomb at 130 C. Photolysis studied from 150 to 350 C. 2 ref.

11223 A New Synthesis of Fluoro-Ketones. A. Sykes, J. C. Tatlow, and C. R. Thomas. *Chemistry & Industry*, 1955, no. 22, May 28, p. 630-631.

Grignard reaction with perfluoro-carboxylic acid. 14 ref.

11224* The Chemical and Physical Properties of Ethoxy Resins as a Function of Their Components. **Die chemischen und physikalischen Eigenschaften von Äthoxyharzen in Abhängigkeit von ihren Kombinationspartnern.** (German.) K. Theile and P. Colomb. *Chimia (Switzerland)*, v. 9, no. 5, May 1955, p. 104-110.

Combinations of ethoxy resins with fatty acids, phenol resins, amino plastics, amines, polyamides, and isocyanates shows that the properties depend on the reactions with ethoxy- and hydroxyl groups. Graph. 6 ref.

11225 Direct Oxidation of Ethylene to Ethylene Oxide. Ralph Landau. *Industrial Chemist and Chemical Manufacturer*, v. 31, May 1955, p. 233-236.

Describes economics, the Lefort process, and the Scientific Design Co. process. Photographs.

11226 Peanut Oil-Oleic Acid-Acetic Acid and Peanut Oil-Oleic Acid-Furfural Ternary Systems. Gopala Venkataraman and G. S. Laddha. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1272-1273.

Studied for extraction of fatty acids from mixtures with vegetable oils. Tables, graphs. 7 ref.

11227* The Effect of Traces of Pyrogallol as an Inhibitor of Peroxide Formation in Solvent Ether B.P. A. Roy. *Journal of Applied Chemistry*, v. 5, Apr. 1955, p. 188-192.

Inhibitor was effective over two years at only 1-mg. per l. and does not interfere with its use as a solvent. Table. 4 ref.

11228 Hydrazine Derivatives of Carbonic and Thiocarbonic Acids. VI. A New Synthesis of Urazole. Paul G. Gordon and L. F. Audrieth. *Journal of Organic Chemistry*, v. 20, May 1955, p. 603-605.

A three-step process using urea and hydrazine. 10 ref.

11229 The Attempted Beckmann Rearrangement of 2,2-Diphenyl-1-Cycloheptanone Oxime. Robert E. Lyle, Herbert L. Fielding, Germaine Cauquil, and Jacques Rouzaud. *Journal of Organic Chemistry*, v. 20, May 1955, p. 623-626.

Reacts to form 7,7-diphenyl-6-heptenonitrile. 7 ref.

11230 Vapor Phase Photochemical Bromination of 2,3-Dimethylbutane and 2,2,4,4-Tetramethylpentane. M. S. Kharasch, Yu Cheng Liu, and Walter Nudenberg. *Journal of Chemistry*, v. 20, May 1955, p. 680-688.

2,3-Dimethylbutane reacts at 100 C and 2,2,4,4-tetramethylpentane reacts at 200 C. 7 ref.

11231 Macromethods for Reducing Aldonic Lactones to Sugars: The Preparation of L-Glucose. Harriet L. Frush and Horace S. Isbell. *Journal of Research, National Bureau of Standards*, v. 54, May 1955, p. 267-268.

Methods for making rare sugars and use in radioactive labeling. 8 ref.

11232* Reaction Mechanisms of Electrophilic Substitution for the Saturated Carbon Atom. **O mekhanizme reaktsii elektrofil'nogo zameshcheniia u nasyshchennogo uglerodnogo atoma.** (Russian.) A. N. Nesmeianov and O. A. Reutov. *Moskovskogo Universiteta Vestnik, Seriia Fiziko-Matematicheskikh i Estesvennykh Nauk*, 1955, nos. 4-5, Apr.-May, p. 133-143.

Nucleophilic, radical, and electrophilic substitutions; manner in which symmetrization takes place. 10 ref.

11233 Small-Angle X-Ray Diffraction Patterns of Collagen. C. R. Worthington and S. G. Tomlin. *Nature*, v. 175, May 7, 1955, p. 811.

Patterns enhanced by $AgNO_3$. Table. 1 ref.

11234* The Chemistry of Natural Macromolecules. **Die Chemie natürlicher Makromoleküle.** (German.) R. Signer. *Naturwissenschaften*, v. 42, no. 10, May 1955, p. 265-270.

Types, constitution, and bonding forces of macromolecules; methods of determining structures of macromolecular substances; effect of orientation of macromolecules on the properties of the respective substance. Structural formulas, micrographs, diagrams.

11235* Brown Coal Bitumens as Natural Wax-Resin Substances. **Bituminy węgla brunatnego jako naturalne substancje woskowo-żywiczne.** (Polish.) Bohdan Karabon and Adam Bartecki. *Wiadomości Chemiczne*, v. 9, no. 2, Feb. 1955, p. 65-84.

Classification and characteristics of waxes and resins: their chemical compositions and uses. Tables. 66 ref.

11236* Investigations in the Field of the Kinetics and Mechanism of the Vapor-Phase Oxidation of Aromatic Hydrocarbons. **Issledovaniia v oblasti kinetiki i mekhanizma parofaznogo okisleniia aromaticheskikh uglevodorodov. VI.** Oxidation Mechanism of Naphthalene on Vanadium Catalysts. **Mekhanizm okisleniia naftalina na vanadievykh katalizatorakh.** (Russian.) I. I. Ioffe and Iu. G. Sherman. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 4, Apr. 1955, p. 692-698.

Includes tables, graph. 6 ref.

Books and Miscellaneous Publications

11237 Glutathione. S. Colowick, A. Lazarow, E. Racker, D. R. Schwarz, E. Stadtman, and H. Waelsch, editors. 341 p. 1954. Academic Press, New York. (QP801.G6 G52)

Symposium covering properties, chemistry, analysis, and physiological actions.

11238 Oxine and Its Derivatives. R. G. W. Hollingshead. v. I-II. Oxine. Pt. I-II. 616 p. 1954. Butterworths Scientific Publications, London. (QD77 H72o)

A reference book on the preparation, physical properties, analytical and non-analytical applications, reaction with miscellaneous metals, and their use in the determination of metals; from alkaline earths to Zn.

11239 General Papers. 370 p. 1955. American Chemical Society, Washington, D. C. (TP690 Am35g)

Consists of 42 papers presented at the meeting of the Division of Petroleum Chemistry in Apr. 1955.

11240 Joint Symposium on Molecular Compounds of Hydrocarbons and Related Substances. 47 p. 1955. American Chemical Society, Washington, D. C. (QD315 Am35j)

A symposium of five papers on properties and applications of urea complexes and on hydrocarbon hydrates.

See also:

11274 (hydrazine synthesis)

CHEMISTRY—PHYSICAL

11241* Surface-Chemical Studies on the Formation of Aluminum Soaps. I. The Interaction Between Aluminum Ions and Rosin Acid Monolayers. II. The Product of the Reaction Between Aluminum Ions and Monolayers of Tall Oil Rosin Acid. (English.) Per Ekwall and Henrik Bruun. *Acta Chemica Scandinavica*, v. 9, no. 3, 1955, p. 412-429.

Includes tables, graphs. 37 ref.

11242 Calculation of Molecular Geometry by Vector Analysis. Application to Six-Membered Alicyclic Rings. Elias J. Corey and Richard A. Sneen. *American Chemical Society, Journal*, v. 77, May 5, 1955, p. 2505-2509.

Method is applied to cyclohexane, cyclohexylidene, cyclohexene, trans-Δ^1-octalin and trans-Δ^2-octalin. Diagrams. 12 ref.

11243 The Mechanisms of Hydrogen Peroxide Reactions. II. A Comparison of the Reactivity of Hydroxyl Ion and Hydroperoxide Ion Toward Benzonitrile. Kenneth B. Wiberg. *American Chemical Society, Journal*, v. 77, May 5, 1955, p. 2519-2522.

Hydroperoxide ion reacts 10^4 times as fast in 50% acetone solution. Tables, graphs. 15 ref.

11244 Nitrogen Peroxide as a Catalyst for the Autoxidation of Hydrobromic Acid. B. E. Merton-Bingham and A. M. Posner. *American Chemical Society, Journal*, v. 77, May 5, 1955, p. 2634-2638.

Nitrogen peroxide carries the O for the HBr autoxidation. Tables, graphs. 7 ref.

11245 Vapor Pressures of the System Sodium Chloride-Aluminum Chloride. E. W. Dewing. *American Chemical Society, Journal*, v. 77, May 5, 1955, p. 2639-2641.

Measured over the range of 50 to 67 mole % of $AlCl_3$. A compound, presumed to be $AlNaCl_4$ exists in the gas phase above mixtures containing around 50 mole % $AlCl_3$. Graphs. 6 ref.

11246 The Heats of Combustion and Formation of Boron Carbide. D. Smith, A. S. Dworkin, and E. R. Van Artsdalen. *American Chemical Society, Journal*, v. 77, May 5, 1955, p. 2654-2656.

Includes tables. 4 ref.

11247 Kinetics of the Oxidation of Cyclohexane With Nitrogen Pentoxide. J. C. D. Brand. *American Chemical Society, Journal*, v. 77, May 20, 1955, p. 2703-2707.

Studied in CCl_4 at 0 and 20 C. Tables, graphs. 16 ref.

11248 Studies on Ion-Exchange Resins. XIII. Selectivity Coefficients of Quaternary Base Anion-Exchange Resins Toward Univalent Anions. Harry P. Gregor, Jack Belle, and R. A. Marcus. *American Chemical Society, Journal*, v. 77, May 20, 1955, p. 2713-2719.

Variation of selectivity coefficients with composition on Dowex 2 resin. Tables, graphs. 14 ref.

11249 Indirect and Direct Action of Heavy Particle Radiation on Acetic Acid in Aqueous Solution. Warren M. Garrison, Winifred Bennett, Sibyl Cole, Herman R. Haymond, and Boyd M. Weeks. *American Chemical Society, Journal*, v. 77, May 20, 1955, p. 2720-2727.

Study of 0.0625 to 16 *M* solutions show formation of H, H_2O_2, and succinic acid mainly, and also CO_2, CH_4, C_2H_6, and CO. Tables, graphs. 31 ref.

11250 The Heat Capacity of Uranium Tetrafluoride From 5 to 300°K. Darrell W. Osborne, Edgar F. Westrum, Jr., and Harold R. Lohr. *American Chemical Society, Journal*, v. 77, May 20, 1955, p. 2737-2739.

Differs with earlier findings. Thermal anomaly is suggested below 5 K. Tables, graphs. 10 ref.

11251 The Formation of Hypoiodous Acid and Hydrated Iodine Cation by the Hydrolysis of Iodine. T. L. Allen and R. M. Keefer. *American Chemical Society, Journal*, v. 77, June 5, 1955, p. 2957-2960.

Equilibrium constants for $HDI + H^+ + I^-$ determined at 25 and 1.6 C by spectrophotometric analysis. Tables, graphs. 15 ref.

11252 The Heats of Reaction of the Dichlorides of Samarium and Ytterbium With Hydrochloric Acid. A Microcalorimeter. G. R. Machlan, C. T. Stubblefield, and L. Eyring. *American Chemical Society, Journal*, v. 77, June 5, 1955, p. 2975-2978.

Heats of formation are calculated. The adiabatic microcalorimeter is for 10 to 20 mg. samples. Tables, diagram. 14 ref.

11253 The Heat Capacities and Entropies of Sulfuric Acid Tri- and Tetrahydrates. E. W. Hornung and W. F. Giauque. *American Chemical Society, Journal*, v. 77, June 5, 1955, p. 2983-2987.

Values measured from 15 to 300 K. Tables. 11 ref.

11254* Ionic Conduction and Disorder of Silver Chloride With Additions. **Zur Ionenleitung und Fehlordnung von Silberchlorid mit Zusätzen.** (German.) Ines Ebert and J. Teltow. *Annalen der Physik*, v. 15, nos. 5-6, 1955, p. 268-278.

Measurement of electrical conductivity of AgCl with $CdCl_2$, $PbCl_2$, CuCl, and Ag_2S inclusions at temperatures ranging from 200 C to the melting point; determination of concentrations and mobilities of holes and of the effect of holes on the energy magnitudes. Tables, graphs. 17 ref.

11255* Study of Metal Hydrides. Lanthanium-Hydrogen System. **Contribution a l'étude des hydrures métalliques. Le système lanthane-hydrogène.** (French.) Bertrand Dreyfus-Alain. *Annales de physique*, v. 10, ser. 12, Mar.-Apr. 1955, p. 305-362 + 2 plates.

Solubility of H in transition metals; structure of lanthanium hydride; the La-H system. Tables, diagrams, graphs. 66 ref.

11256 Light Absorption Studies. I. Ultraviolet Absorption Spectra of Substituted Acetophenones. W. F. Forbes and W. A. Mueller. *Canadian Journal of Chemistry*, v. 33, June 1955, p. 1145-1154.

Steric hindrance as cause of anomalous reaction rates is verified. Tables. 14 ref.

11257 Growth Rates of Single Crystals of Ethylene Diamine Tartrate. A. H. Booth and H. E. Buckley. *Canadian Journal of Chemistry*, v. 33, June 1955, p. 1155-1161.

Observed by a travelling microscope under controlled conditions, some "spurts" are shown on the fastest growing faces. Graphs, diagram. 10 ref.

11258 The Effect of Boric Acid on the Growth of Ethylene Diamine Tartrate Crystals. A. H. Booth and H. E. Buckley. *Canadian Journal of Chemistry*, v. 33, June 1955, p. 1162-1165.

Boric acid (0.1 to 1.0 g. per l.) serves as an "improver" by slowing process to form dense, sound crystals. Diagram, graph. 4 ref.

11259 The Infrared and Raman Spectra of *cis* and *trans* Dibromoethylene, Tribromoethylene, and an Application of the Frequency Sum Rule. J. C. Evans and H. J. Bernstein. *Canadian Journal of Chemistry*, v. 33, June 1955, p. 1171-1182.

Thermodynamic functions are calculated. Tables, graph, infrared spectra, Raman spectra. 20 ref.

11260* Heats of Combustion and Formation of Some Organosilicon Compounds. (English.) Toshio Tanaka, Ukiko Takahashi, Rokuro Okawara, and Takeo Watase. *Chemical Society of Japan, Bulletin*, v. 28, no. 1, Jan. 1955, p. 15-18.

Data on complete combustion of five compounds. Table. 25 ref.

11261* Surface Chemistry of Synthetic Protein Analogues. VI. The Interaction of Urea and Salt With Non-Electrolytic Polypeptides. (English.) Toshizo Isemura, Kozo Hamaguchi, and Hideyo Kawasato. *Chemical Society of Japan, Bulletin*, v. 28, no. 3, Apr. 1955, p. 185-189.

Uses preferential straight-chain adducts of urea. Table, graphs. 7 ref.

Chemistry—Physical

11262* Radiochemical Studies on Ultra-Micro Quantities of Organometallic Compounds. III. On Hydroxyquinolates of Promethium and Yttrium. (English.) Tomitaro Ishimori. *Chemical Society of Japan, Bulletin*, v. 28, no. 3, Apr. 1955, p. 203-207.

Solubility of active factor in hydroxyquinolate-$CHCl_3$ indicates the organometal. Table, graphs. 8 ref.

11263* Selenium Acids. **Über Selenensäuren. I.** Preparation of Selenium Acids by Reduction of Selenenic Acids With Hydrazin. **Darstellung von Selenensäuren durch Reduktion von Seleninsäuren mittels Hydrazins.** (German.) Heinrich Rheinboldt and Ernesto Giesbrecht. *Chemische Berichte*, v. 88, no. 5, 1955, p. 666-678.

Includes tables. 26 ref.

11264* Nature and Properties of Ion Exchangers. **Wesen und Eigenschaften von Ionenaustauschern.** (German.) G. Naumann. *Chemische Technik*, v. 7, no. 5, May 1955, p. 255-261.

Principle and mechanism of ion-exchange reactions explained for different ion exchangers. Graphs, diagrams, micrographs, tables. 25 ref.

11265* The Transition Point of Chromium Sesquioxide and Its Electrical Conductivity at Low Temperatures. **Sur le point de transition du sesquioxyde de chrome et sa conductibilité électrique aux températures peu élevées.** (French.) Jean Roche and Jean Jaffray. *Comptes rendus*, v. 240, no. 23, June 6, 1955, p. 2212-2213.

Results obtained in measuring electrical conductivity of ten specimens of Cr_2O_3 between 20 and 60 C showing a transition point of 33 C. 7 ref.

11266* Thermal Conversion of Akyl (aryl) Acetoxysilanes and Alkylhydroxysilanes Into Polyorganosiloxanes and Polyorganometallosiloxanes. **O termicheskom prevrashchenii alkil (aril) atsetoksisilanov i alkilgidroksisilanov v poliorganosiloksany i v poliorganometallosiloksany.** (Russian.) K. A. Andrianov, A. A. Zhdanov, and S. A. Pavlov. *Doklady Akademii Nauk SSSR*, v. 102, no. 1, May 1, 1955, p. 85-88.

Includes graphs, table. 3 ref.

11267* Kinetics and Mechanisms of Reactions in the Presence of Thin Films of Non-Volatile Acids. Hydration of Propylene and Dehydration of Isopropyl Alcohol on Phosphoric Acid. **Kinetika i mekhanizm reaktsii v prisutstvii tonkikh plenok neletuchikh kislot. Gidratatsiia propilena i degidratatsiia izopropilovogo spirta na fosfornoi kislote.** (Russian.) N. M. Chirkov and V. I. Tsvetkova. *Doklady Akademii Nauk SSSR*, v. 102, no. 2, May 11, 1955, p. 311-314.

Includes graphs, tables. 6 ref.

11268 The Fluorescence Quenching of Anthracene, 9-Phenylanthracene and 9:10-Diphenyl-Anthracene in the Vapour Phase. B. Stevens. *Faraday Society, Transactions*, v. 51, May 1955, p. 610-619.

Behavior at 300 C of vapor excited by 3600 A. radiation, with and without foreign gases. Tables, graphs, diagram. 24 ref.

11269 The Heats of Formation of Metallic Halides. Titanium Tetrachloride. P. Gross, C. Hayman, and D. L. Levi. *Faraday Society, Transactions*, v. 51, May 1955, p. 626-629.

Standard heat of formation is −190.3 kcal. per mole by direct combination. Tables, diagram. 11 ref.

11270 An Experimental Method of Measuring the Thermal Conductivity of Gases. A. B. Callear and James C. Robb. *Faraday Society, Transactions*, v. 51, May 1955, p. 630-638.

Method applies to low pressures with no interference from temperature discontinuity at the gas-solid interface. Tables, graphs, diagrams. 12 ref.

11271 Thermal Effects in Mercury Photo-Sensitized Reactions. II. The Interaction of Atomic Hydrogen With Olefines. III. Reactions in Hydrogen + Oxygen Mixtures. A. B. Callear and James C. Robb. *Faraday Society, Transactions*, v. 51, May 1955, p. 638-656.

Gas temperature indicates course of a reaction. Graphs. 17 ref.

11272 The Pyrolysis of Mercury Dimethyl. I. The Dissociation Energies of the Mercury-Carbon Bonds. II. The Reaction Mechanism. Catherine M. Laurie and L. H. Long. *Faraday Society, Transactions*, v. 51, May 1955, p. 665-679.

Measured in a static system from 294 to 333 C; a new mechanism is proposed. Tables, graphs. 78 ref.

11273 Electrochemical Properties of Ion-Exchange Resins. I. Membrane Potentials and Conductivity of Cross-Linked Polymethacrylic Acid. G. J. Hills, J. A. Kitchener, and P. J. Ovenden. *Faraday Society, Transactions*, v. 51, May 1955, p. 719-728.

Transport numbers indicate membrane perm-selectivity. Tables, graphs, diagrams. 29 ref.

11274 Metal Deactivators in Synthesis of Hydrazine. R. W. Sanftner, M. M. Jones, and L. F. Audrieth. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1203-1206.

Role of deactivators explored; three substitutes for gelatin are suggested. Table, graphs. 20 ref.

11275 Preflame Oxidation and Detonation of Cyclopentane and 2,2,4-Trimethylpentane. B. J. Reitzer and G. G. Lamb. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1239-1243.

The degenerate-branching chain mechanism describes the reactions. Table, graphs. 13 ref.

11276 Effects of Counterelectro-Osmosis and Sodium Ion Exchange on Permeability of Kaolinite. A. S. Michaels and C. S. Lin. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1249-1253.

Counterelectro-osmosis offers about 5% resistance to water but increased Na^+ content causes an irreversible permeability decrease. Tables, graphs, diagram. 12 ref.

11277 Nuclear Magnetic Resonance in Concentrated Aqueous Electrolytes. James N. Shoolery and Berni J. Alder. *Journal of Chemical Physics*, v. 23, May 1955, p. 805-811.

Water is examined with various diamagnetic salts, and describes their effect on the magnetic shielding of protons in the water mol. Tables, graphs. 14 ref.

11278 Substituted Methanes. XXVI. Raman and Infrared Spectral Data, Assignments, Potential Constants, and Thermodynamic Properties for $CHBrCl_2$ and $CDBrCl_2$. Santiago R. Polo, Ann Palm, Fred L. Voelz, Forrest F. Cleveland, Arnold G. Meister, Richard B. Bernstein, and Robert H. Sherman. *Journal of Chemical Physics*, v. 23, May 1955, p. 833-837.

Includes tables, infra-red spectra. 11 ref.

11279 Thermal Accommodation Coefficient of Helium on a Bare Tungsten Surface. Lloyd B. Thomas and E. B. Schofield. *Journal of Chemical Physics*, v. 23, May 1955, p. 861-866.

Determined by a getter technique with Al from 83 to 303 K. Tables, graphs, diagram. 7 ref.

11280 Reactions of Nitrogen Activated by Electric Discharge. R. N. Varney. *Journal of Chemical Physics*, v. 23, May 1955, p. 866-868.

Only N need be passed through the discharge to form a neutral, activated state. Diagram. 4 ref.

11281 Decomposition of Carbon Dioxide by Ionizing Radiation. I. P. Harteck and S. Dondes. *Journal of Chemical Physics*, v 23, May 1955, p. 902-908.

Solid CO_2 goes to CO and O, gaseous CO_2, plus as little as 0.5% NO_2, also forms CO and O when exposed to Rn or neutrons. Tables, graphs, diagrams. 15 ref.

11282 Infrared Spectrum of Trideuterosilane and the Structure of the Silane Molecule. D. R. J. Boyd. *Journal of Chemical Physics*, v. 23, May 1955, p. 922-926.

Prepared by action of $LiAlD_4$ on $SiCl_3H$ and examined with a high resolution infra-red spectrometer. Tables, infra-red spectrum. 10 ref.

11283 Infrared Spectrum, X-Ray Diffraction Pattern, and Structure of Ammonium Fluoride. Robert C. Plumb and Donald F. Hornig. *Journal of Chemical Physics*, v. 23, May 1955, p. 941-953.

Shows tetrahedonal symmetry with slight unexplained disorder. Tables, diagrams, ultra-violet spectrum. 12 ref.

11284 Studies of the Interaction Between Stable Molecules and Atoms. I. A Molecular Orbital Theory of the Activation Energy Between Molecules and Atoms. II. Interaction Between Two Helium Atoms. III. A Molecular Orbital Tractment of the Quadratic Form of H_4. IV. The Energy of the Linear H_4 Complex. V. Molecular Orbital Approach to the H+H_2 Reaction. Virginia Griffing, J. F. Wehner, Andrej Maček, and Joseph T. Vanderslice. *Journal of Chemical Physics*, v. 23, June 1955, p. 1015-1042.

Includes tables, graphs, diagrams. 62 ref.

11285 Long Time Phosphorescence of Organic Crystals. Hartmut Kallmann, Bernard Kramer, and Eugene Sucov. *Journal of Chemical Physics*, v. 23, June 1955, p. 1043-1047.

Phosphorescence (order of min.) in single crystals of anthracene, stilbene, naphthalene, and durene. Table, graphs, diagrams. 8 ref.

11286 Theory of Normal Paraffin Liquids. Michio Kurata and Sin-iti Isida. *Journal of Chemical Physics*, v. 23, June 1955, p. 1126-1131.

A hole theory is developed to relate physical constants with the no. of C atoms. Tables, graphs. 13 ref.

11287 Chemical Effects Accompanying Hydrogen Bonding. III. A. H. Blatt. *Journal of Organic Chemistry*, v. 20, May 1955, p. 591-602.

o-Hydroxybenzophenone oximes were studied because of their unusual behavior. 9 ref.

11288* Effect of Indifferent Electrolytes on the Behaviour of Surface Active Substances at the Dropping Mercury Electrode. (English.) S. L. Gupta. *Kolloid-Zeitschrift*, v. 141, no. 2, Apr. 1955, p. 100-102.

Includes graphs. 4 ref.

11289* The Definitive Form of the New Thermal Equation of State and Constants of Over 100 Different Substances. **Die definitive Form der neuen thermischen Zustandsgleichung nebst ihren Stoffkonstanten von über 100 verschiedenen Stoffen.** (German.) Joseph Himpan. *Monatshefte für Chemie*, v. 86, no. 2, Apr. 1955, p. 259-268.

Facilitation of quantitative calculations by table of constants. Tables. 32 ref.

11290 High-Resolution Autoradiography of Water-Soluble Substances. M. J. Canny. *Nature*, v. 175, May 14, 1955, p. 857-858.

Includes micrographs. 2 ref.

11291 Use of Solubilizing Agents in Gas-Phase Partition Chromatography. J. H. Purnell and M. S. Spencer. *Nature*, v. 175, June 4, 1955, p. 988-989.

Stearic acid on asdorbent enhances separation. Table, chromatograms. 2 ref.

11292* Magnetocatalytic Effect. **Über den magnetokatalytischen Effekt. II.** (German.) Georg-Maria Schwab and Herbert Goetzeler. *Zeitschrift für physikalische Chemie (Frankfurt)*, v. 4, nos. 3-4, June 1955, p. 148-156.

Reactions of H with O and N_2O with ethylene studied to determine the effect of Ni, NiCr, and NiCu catalysts as a function of temperature. Diagram, graphs. 20 ref.

11293* Investigation of Equilibrium in Reduction of TiO_2 by Carbon at High Temperatures. **Issledovanie ravnovesiia v reaktsii vosstanovleniia TiO_2 uglerodom pri vysokikh temperaturakh. I.** (Russian.) V. S. Kutsev and B. F. Ormont. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 4, Apr. 1955, p. 597-601.

Phases of TiC_xO_y-C-CO in a temperature range of 1650-2000 C and at pressures of 150-800 mm. Hg; reduction of TiO_2 and TiC_xO_y results in a series of intermediate oxides; structure and properties of $TiO_{1.7}$. Table, diagram. 14 ref.

11294* Investigation of the Crystallization of Salts From Supersaturated Aqueous Solutions. **Issledovanie kristallizatsii solei iz peresyshchennykh vodnykh rastvorov.** (Russian.) A. V. Shlykov and S. V. Gorbachev. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 4, Apr. 1955, p. 607-614.

Association of crystallization temperature decreases with solution of dispersive impurities. Diagrams, graphs. 14 ref.

11295* Investigation of Equilibria in the Formation of carbides From Oxides at High Temperatures. **Metod issledovaniia ravnovesii v reaktsiiakh obrazovaniia karbidov iz okislov pri vysokikh temperaturakh.** (Russian.) V. S. Kutsev, B. F. Ormont, and V. A. Epel'baum. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 4, Apr. 1955, p. 629-634.

Includes diagrams, graphs, table. 8 ref.

Books and Miscellaneous Publications

11296 Ionography. Electrophoresis in Stabilized Media. Hugh J. McDonald. 268 p. 1955. Year Book Publishers, Chicago. (QD561 M45i)

Apparatus; techniques; applications.

11297 Clayton's—The Theory of Emulsions and Their Technical Treatment. C. G. Sumner. 5th Ed. 669 p. 1954. J. & A. Churchill, London. ((TP156.E6 C57t5)

Foams, synthetic emulsifying agents, emulsion-breaking agents, lubricants, mixing impellers, globule-size determination, paint, lacquer and pesticidal emulsions, and polymerizations in emulsions are discussed.

11298 Apparatus for Surface-Area Determinations and Other Adsorption Studies on Solids. R. F. Vance and J. N. Pattison. PB 116263. 20 p. 1954. Library of Congress, Publication Board Project, Washington, D. C.

Investigation provides information on the construction, calibration, and operation of an apparatus used to determine surface area, pore structure, and absorptive behavior of solids.

See also:

11149 (properties of MgH_2)
11170 (a.c. polarography)
11189 (elution constants)
11544 (synthesis of organic compounds)
12290 (rate equation integration)

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11299 Fundamentals of Paint, Varnish and Lacquer Technology. XV. Industrial Finishes—Baking. Elias Singer. *American Paint Journal*, v. 39, May 23, 1955, p. 78 + 6 pages; June 6, 1955, p. 88 + 8 pages.

Theory, peroxidation, and heat cure; can and other speciality enamels are formulated.

11300 Industrial Maintenance Coatings Based on Phenolic Resins. George A. Wells. *American Paint Journal*, v. 39, June 13, 1955, p. 70 + 8 pages.

Chemistry of the phenolics and their formulation in primers. Diagrams, tables.

11301 Fire Retardant Paints. William Brushwell. *American Paint Journal*, v. 39, June 20, 1955, p. 24 + 7 pages.

Covers properties, mechanisms, and needs for such paints; proposes tests. Tables. 9 ref. (To be continued.)

11302 Recent Navy Experience With Saran and Vinyl Coatings. W. W. Cranmer. *American Paint Journal*, v. 39, June 20, 1955, p. 86 + 4 pages.

Saran was successful as fuel tank lining as were vinyl systems as bottom coatings.

11303* Thixotropic Measurements of Bentonite Suspensions. Harris B. Bernstein and Martin Barr. *American Pharmaceutical Association, Journal, (Scientific Ed.)*, v. 44, June 1955, p. 375-377.

Use of the hysteresis loop method; effect of pH. Tables, graph. 8 ref.

11304* Spray Silvering of Mirrors Saves Time and Materials. **Sproeiverzilveren van spiegels geeft besparingen aan tijd en grondstoffen.** (Dutch.) *Bedrijf en Techniek*, v. 10, no. 229; *Electronica section*, v. 8, no. 176, June 4, 1955, p. 275, 282.

Discusses the procedure of spraying Ag for the production of different types of mirrors and the advantages of the process. 2 ref.

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11305 Vaporization of Metals and Metalloids in Vacuum. H. Laporte. *Henry Brutcher Translation No.* 3439, 8 p. (From *Chemische Technik*, v. 5, no. 11, 1953, p. 632-634.) Henry Brutcher, Altadena, Calif.

Data on melting point, boiling point, vapor pressure, vol. change on fusion, pressure coefficients of melting point, and corresponding temperatures of a no. of metals and metalloids. Tables. 3 ref.

11306 Causes of Defects in Phosphate Coatings. E. Wagner. *Henry Brutcher Translation No.* 3507, 7 p. (Abridged from *Mitteilungen Forschungs-Gesellschaft Blechverarbeitung*, 1954, no. 7, p. 79-82.) Henry Brutcher, Altadena, Calif.

Possible faults in the various stages of activated hot phosphating, using zinc phosphate solutions, and hints for avoiding them.

11307* The Role of Ethylene Glycol and Polyethylene Glycol in the Freeze-Thaw Stability of Synthetic Latex. (English.) Seizo Okamura and Takuhiko Motoyama. *Chemical Society of Japan, Bulletin*, v. 28, no. 1, Jan. 1955, p. 61-64.

Both compounds improve stability by adsorption on the particles. Tables, graphs. 5 ref.

11308 Preliminary Evaluation of Protective Coating Systems. R. W. Flournoy. *Corrosion*, v. 11, July 1955, p. 289-290.

Tests of coatings formulated from organic materials with high electrical resistance, including determination of thickness, flaws, adhesion, and chemical resistance. Photographs.

11309* Paint Faults and Remedies. II. Peeling. H. Courtney Bryson. *Corrosion Prevention and Control*, v. 2, June 1955, p. 27-31, 41.

Requisites for obtaining good adhesion include preparation of a clean surface, immediate application of paint, use of corrosion resistant primer and a good top coat. Photograph.

11310* Corrosion Prevention Practice. IV. Protecting a Tanker. *Corrosion Prevention and Control*, v. 2, June 1955, p. 40-41.

Use of Epikote resin based coating, cathodic protection, and metal sprayed coating in tests for corrosion prevention in ballast tanks. Photograph.

11311 Conductive Coating for Aluminum. John A. Connor and R. Stricklen. *Electrical Manufacturing*, v. 55, June 1955, p. 105-107.

Contact resistance and corrosion properties of Al components are improved by chromate surface conversion treatment applied by immersion at room temperature. Table, photographs, graphs.

11312 Finishes for Aluminium. A. W. Brace. *Engineers' Digest*, v. 16, May 1955, p. 244-247, 252.

Methods of producing finishes of both utilitarian and aesthetic value. Photographs, tables.

11313 Finishes That Stand Metal Forming. F. D. Johnson. *Industrial Finishing (London)*, v. 8, May 1955, p. 276, 278, 280.

Properties, application, baking, and formulation, of finishes for coating bottle caps, toys, etc. before metal forming. Photographs.

11314 Are Pure Oxides the Answer to High Temperature Problems? *Iron Age*, v. 176, July 7, 1955, p. 104-105.

Pure oxide coatings resistant to temperatures above 3000 F and erosion at supersonic speeds offer new means of protecting metals in rocket and jet engine parts. Photographs, tables.

11315* The Chemistry of Some Complex Zinc and Cadmium Chrome Pigments. H. G. Cole and L. F. Le Brocq. *Journal of Applied Chemistry*, v. 5, Apr. 1955, p. 149-170.

Conditions for the formation of basic double chromates are found from pH curves. Tables, graphs, X-ray diffractograms. 12 ref.

11316* The Formulation of Priming Paints for Structural Steel. J. C. Hudson and J. F. Stanners. *Journal of Applied Chemistry*, v. 5, Apr. 1955, p. 173-188.

Interim report of a BISRA sub-committee recommends primer of red Pb, white Pb, and asbestine in linseed oil for weathered steel. Tables, graphs, diagram, photographs. 4 ref.

11317 Tests on the Relative Efficiency of Chromate Pigments in Anticorrosive Primers. H. G. Cole. *Journal of Applied Chemistry*, v. 5, May 1955, p. 197-208.

Sea-water-spray corrosion tests made on two Mg alloys, an Al alloy, and mild steel, painted with primers made from seventeen pigments, showed best protection by strontium chromate and poorest results from three complex Cd, three Pb chromes, and barium chromate. Tables. 14 ref.

11318* Petroleum Base Rust Preventives. *Lubrication*, v. 41, June 1955, p. 61-72.

Theory of rusting of Fe and steel; preservative lubricants; preservative coatings; surface preparation prior to application of petroleum base rust preventatives; application of preventatives. Tables, photographs, micrographs.

11319 Hot Spray Painting. (English and Spanish.) R. H. Warring. *Machinery Lloyd (Overseas Ed.)*, v. 27, May 21, 1955, p. 81-83.

By using heat, the spray contains a considerably greater proportion of solids which, with proper technique, do not sag or run; overspray is considerably reduced, with an overall saving in production time and costs. Graph, table, diagrams.

11320 Nylon-Coated Metal Parts for Wear Resistance. Louis L. Stott. *Materials & Methods*, v. 41, June 1955, p. 92-94.

Coating process makes it possible to combine the good frictional characteristics of nylon with the better dimensional stability of metals. Photographs, graph.

11321 Surface Treatment and Finishing of Light Metals. VI. Anodizing of Aluminum. S. Wernick and R. Pinner. *Metal Finishing*, v. 53, June 1955, p. 91-98.

An account of the more important industrial anodic processes and their applications. Table, graphs, diagram. 51 ref.

11322* The Surface Treatment in the Electric Industry, With Special Consideration of the Telecommunications Industry. **Die Oberflächenbehandlung in der Elektroindustrie unter besonderer Berücksichtigung der Fernmeldetechnik.** (German.) K. Leich. *Metall*, v. 9, nos. 11-12, June 1955, p. 478-482.

Brief discussion of the functions of coating metals with Ni, Zn, Cd, Cu, Cl, Sn, Al, noble metals, and inorganic and organic nonmetallic substances, metal coatings on non-conductors, and various non-coat-forming surface treatments. 34 ref.

11323* Modern Metal Spraying for Rust Protection in Austria. **Neuere Rostschutz-Spritzmetallisierungen in Österreich.** (German.) H. Reininger and R. Rengshausen. *Metall*, v. 9, nos. 11-12, June 1955, p. 487-488.

Evaluation of sprayed Zn and Al coatings. Photographs. 12 ref.

11324* Corrosion Protection by Cold Zinc Coating. **Korrosionsschutz durch Kaltverzinkung.** (German.) I. C. Fritz. *Metall*, v. 9, nos. 11-12, June 1955, p. 488-489.

Evaluation of the protective effect and properties of Zn-dust paint and Zn-paste coatings. Photographs. 6 ref.

11325* Weights of Deposits, Yields, and Losses in the Wire-Spraying Process. **Schichtgewichte, Ausbeuten und Verluste beim Drahtspritzverfahren.** (German.) Hans Reininger. *Metalloberfläche*, Ausgabe B, v. 9, no. 6, June 1955, p. 81-85.

Experiments on the amount of metal deposited by the metal-spraying process and suggestions for improving the economy of metal spraying. Tables, graphs, diagrams. 9 ref.

11326* Corrosion-Resistant Coatings of Paint on Aluminum. **Korrosionsfeste Farbanstriche auf Aluminium.** (German.) Heinz Anders. *Metalloberfläche*, Ausgabe B, v. 9, no. 6, June 1955, p. 85-87.

Treatment of Al exposed to different types of corroding influences; classes of suitable coatings and their characteristics. 3 ref.

11327* Study of Stria Resulting From Hot-Dip Tinning. **Étude des stries de l'étamage à chaud.** (French.) S. Chatel, P. Kozakevitch, and P. Rocquet. *Métaux, Corrosion-Industries*, v. 30, no. 354, Feb. 1955, p. 78-87.

Mechanism of formation and methods of elimination of stria formed during the coating of Sn plate. Tables, diagrams, micrograph. 3 ref.

11328* Strengthening of the Oxide Film on Tin to Improve Corrosion Resistance. **Le film d'oxyde sur l'étain et son renforcement pour améliorer la résistance à la corrosion.** (French.) S. C. Britton. *Métaux, Corrosion-Industries*, v. 30, no. 355, Mar. 1955, p. 134-138.

Addition of alloy elements to the metal; chemical and electrochemical treatment of the surface; treatment of Sn in a film-forming solution.

11329* Epoxy Coatings for Metal Decorating Finishes. M. A. Glaser, E. J. Bromstead, and G. L. Weaver. *Modern Lithography*, v. 23, June 1955, p. 77, 79, 157.

Four classes of epoxy resin materials for use in metal decorating. Table, photograph.

11330* The Spontaneous Combustion of Various Catalysts for Epoxy Resins. James Bohlen. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 27, May 1955, p. 261-263.

Reported troubles with amine catalysts. Tables.

11331* The Use of 2,2,6,6,-Tetramethyloleyclohexanol in Alkyd Resins and Related Coating Vehicles. T. H. G. Michael. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 27, May 1955, p. 273-279.

Includes tables, diagram, photographs. 6 ref.

11332* Yellowing and Gloss Retention of Pure Oil Esters and Alkyds. R. A. Johnston and E. B. FitzGerald. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 27, May 1955, p. 280-286.

Correlation of rate and extent of yellowing in films with initial structure of the material. Tables. 5 ref.

11333* Operating Manual for Production Employees in the Paint and Varnish Industry. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 27, May 1955, p. 288-299.

Safety and common sense for the paint industry. Diagrams.

11334* Vinyl Resin Solutions and Dispersions for Industrial Metal Protection. Frank A. Rideout. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 27, June 1955, p. 322-342.

Uses, formulas, and application of Bakelite resins including plastisols and organosols. Tables, graphs, diagram, photographs.

11335* Insulating Materials and Functional Evaluation. L. P. Mahon. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 27, June 1955, p. 354-365.

Heat tolerance is main consideration; AIEE classifications given. Graphs, photographs. 3 ref.

11336* Corrosion Resistant Paints. Henry L. Beakes. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 27, June 1955, p. 366-370.

Properties of films; surface pretreatment; painting tips. 14 ref.

11337* The Water Resistance of Air-Dried Alkyd Resins. W. R. R. Park. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 27, June 1955, p. 371-386.

Concludes that excess polyol lowers water resistance. Tables, graphs.

11338 Evaluation of Emulsion Paints. R. J. Woodbridge. *Oil & Colour Chemists' Association, Journal*, v. 38, June 1955, p. 285-299.

Test methods, developed in a 4.5 yr. study, are described. Tables, graphs, photographs. 5 ref.

11339* The Effect of Chromic and Chromic-Phosphoric Acid Rinse Solutions on the Durability of Paint Coatings. Jodie Doss. *Organic Finishing*, v. 16, June 1955, p. 7-13.

Tests are run at room temperature and at 165 F. Photographs.

11340 Development of Exterior Coatings for Wood. J. F. Broeker. *Paint, Oil & Chemical Review*, v. 118, June 2, 1955, p. 16-17, 20.

Problems in pigment and vehicle choice; extent of test program.

11341 The Properties and Applications of Epoxide Resin Esters. R. N. Wheeler. *Paint Technology*, v. 19, May 1955, p. 159-163.

Examples of end-use tailored vehicles. Graphs, table. 7 ref. (To be continued.)

11342* Effect of Kaolinite Particle Size and Pvc on Important Properties of Various Paint Systems. I. W. Robert Price, Jr. *Paint and Varnish Production*, v. 45, June 1955, p. 27-35.

Gloss, contrast ration, and viscosity considered for six grades. Tables, graphs, diagram, micrographs. 14 ref. (To be continued.)

11343 Electrostatic Paint Spray for Automatic Finishing. Irving Feldman. *Precision Metal Molding*, v. 13, June 1955, p. 63, 65-66.

Describes a system that incorporates, in a closed circuit, cleaning, surface preparation, drying, spray painting, and baking. Photographs.

11344* Limitations in the Use of Flame Spraying. **Anwendungsgrenzen des Flammspritzens.** (German.) Hans von Hofe. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 180-188.

Principle of metal spraying and its proper uses as a protection against rusting, corrosion, and scaling; for applying decorative and wear-resistant coatings, and bearing metals; for forming molds, and for the application of electrically conducting films and screens in the electrical and electronic industry. Photographs, graphs, table. 4 ref.

11345* Zinc-Coating Plants for Tubes. **Rohrverzinkungsanlagen.** (German.) Josef Leutbecher. *Stahl und Eisen*, v. 75, no. 12, June 16, 1955, p. 777-779.

Details of operation, mechanical equipment with a view to most economical production, output of the plant, and other characteristic data. Diagrams, photographs.

11346 Reactive Sputtering and Associated Plant Design. L. Holland and G. Siddall. *Vacuum*, v. 3, July 1953, p. 245-253.

Advantages, gas-metal reactions, and plant design are discussed. Desirable performance features of a plant are enumerated. Diagram, graph. 19 ref.

11347 The Inert-Gas Metal-Arc Overlay Process. C. R. Felmley. *Welding Journal*, v. 34, June 1955, p. 542-550.

Discussion of the many factors that affect penetration with inert-gas metal-arc welding. Photographs, diagrams.

11348* Surface Protection of Work Pieces in the Manufacturing Processes of Mechanical Engineering. **Der Werkstück-Oberflächenschutz im Fabrikationsablauf des Maschinenbaus.** (German.) Burchard Van der Bruggen. *Werkstoffe und Korrosion*, v. 6, no. 5, May 1955, p. 223-227.

Reduction of costs by application of a paint or varnish protective coating on cast iron work pieces while in the manufacturing process. Diagrams, graphs, table.

11349* Corrosion and Heat Resistance of Carbon and Special Steel After Technochemical Surface Treatment. **Korrosions- und Hitzebeständigkeit von Kohlenstoffstahl und von Sonderstahl nach chemisch-technischer Oberflächenbehandlung.** (German.) Walther Köhler. *Werkstoffe und Korrosion*, v. 6, no. 5, May 1955, p. 228-236.

Formation and structure of surface layers. Corrosion and heat resistance of cemented, nitrided, cyanided, aluminized, chromized, siliconized, beryllized, molybdenized, tungstenized, or vanadized carbon and special steels. Tables. 75 ref.

11350 Hot Dip Galvanizing Is a Science. V. Wallace G. Imhoff. *Wire and Wire Products*, v. 30, June 1955, p. 681-683, 726-727.

An experiment to ascertain the relation between the drawing time of the article galvanized and the wt. of the Zn deposited as galvanized coating. Tables, graphs.

11351* Method of Detecting Pores in Films of Lacquer and Other Insulating Coatings. **Prüfmethode zum Auffinden von Poren in Lackschichten und anderen isolierenden Folien.** (German.) Carl Hellmuth Hertz. *Zeitschrift für angewandte Physik*, v. 7, no. 4, Apr. 1955, p. 183-187.

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Direct electrical method of detecting pores in insulating and protective coatings. Diagrams, photographs, table. 7 ref.

Books and Miscellaneous Publications

11352 Vapor-Plating. C. F. Powell, I. E. Campbell, and B. W. Gonser. Electrochemical Society Series. 158 p. 1955. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. (TS653 P87v)

With emphasis on the chemical process involved, rather than the physical, a unified picture is presented of the principles, techniques, and conditions required for the deposition of pure metals, carbides, nitrides, borides, silicides, and oxides from gaseous mixtures of their vaporized compounds. Summarizing the properties of the resulting coatings and materials, new applications for the process are suggested.

11353 ASTM Standards on Paint, Varnish, Lacquer, and Related Products. 848 p. 1955. American Society for Testing Materials, Philadelphia. (TP934 Am35p)

A collection of all the ASTM specifications, methods of test, and definitions pertaining to paint, varnish, lacquer, and related products in convenient form for use of the industry.

See also:

11092 (flame-resistant coatings)
11444 (phosphate coatings)
11448 (finishing aluminum)
11982 (effect of coatings on mechanical properties of metals)
12157 (thickness measurements of coatings)
12159 (testing oxide coatings)

CORROSION

11354 Report of Committee A-5 on Corrosion of Iron and Steel. *American Society for Testing Materials, Preprint No.* 4, 1955, 48 p. (TA401 Am35p)

Summarizes results of atmospheric corrosion tests on wire, wire products, and structural shapes. Proposed tentative specifications for Zn-coated steel chain-link fence fabric; Zn-coated (galvanized) Fe or steel sheets, coils, and cut lengths; 1.25 oz. ordered coating (pot yield) Zn-coated (galvanized) Fe or steel roofing sheets; and Zn-coated (galvanized) steel tie wires. Tables.

11355 Report of Committee A-10 on Iron-Chromium, Iron-Chromium-Nickel, and Related Alloys. *American Society for Testing Materials, Preprint No.* 7, 1955, 15 p. (TA401 Am35p)

Tentative recommended practice for conducting acidified Cu SO_4 test for intergranular attack in austenitic stainless steel and for boiling nitric acid test for corrosion-resisting steels. Micrographs, table.

11356 The Atmospheric Corrosion of Rolled Zinc. E. A. Anderson. *American Society for Testing Materials, Preprint No.* 91a, 1955, 9 p. (TA401 Am35p)

Corrosion of Zn in the atmosphere is controlled by three principal factors; the frequency of rain and dewfall, the acidity of moisture, and the rate of drying. Tables. 5 ref.

11357 Effect of Natural Atmospheres on Copper Alloys: 20-Year Test. A. W. Tracy. *American Society for Testing Materials, Preprint No.* 91b, 1955, 10 p. (TA401 Am35p)

Corrosion resistance of 11 Cu alloys exposed to industrial, marine, and rural atmospheres over a period of 20 yr. Evaluation is based on wt.-loss measurements and changes in mechanical properties of sheet specimens. Tables, graphs. 7 ref.

11358 The Atmospheric Corrosion of Copper—Results of 20-Year Tests. D. H. Thompson, A. W. Tracy, and John R. Freeman, Jr. *American Society for Testing Materials, Preprint No.* 91c, 1955, 11 p. (TA401 Am35p)

Eleven brands of Cu, in the form of sheet and wire, were exposed for 20 yr. to four outdoor atmospheres, and the effect of corrosion was evaluated by loss in wt. and strength, and gain in electrical resistance. Tables. 5 ref.

11359* Oxide Scaling on Nickel. **Zgorzelina tlenkowa na niklu.** (Polish.) Lucjan Czerski and Franciszek Franik. *Archiwum Górnictwa i Hutnictwa,* v. 3, no. 1, 1955, p. 43-68.

Mechanism of scale formation at high temperatures; chemical composition and micro-structure of scale at various depths. Experimental method involves use of a "witness" metal (Pt wires) in following the scaling process. Diagrams, micrographs, tables. 24 ref.

11360* Technical Problems of V_2O_5. **Technische Problemeum das V_2O_5.** (German.) K. Konopicky. *Brennstoff-Chemie,* v. 36, nos. 9-10, May 11, 1955, p. 151-155.

Effect of V_2O_5 on furnace linings and metal parts. Graphs, tables, photographs. 63 ref.

11361* Formation of Protective Layer and Steam Decomposition (Cracking) in Steel Pipes at High Temperatures. **Schutzschichtbildung und Dampfspaltung in Stahlrohren bei hohen Temperaturen.** (German.) E. Ulrich. *Brennstoff-Wärme-Kraft,* v. 7, no. 6, June 1955, p. 241-248.

Decomposition of steam into O and H at high temperatures and its influence of inside surface of steel pipes. The theory of the phenomenon. Diagram, graphs, tables. 12 ref.

11362 Corrosion Fatigue of Low-Carbon Steel Welded Joints. A. M. Abd-El-Wahed. *British Welding Journal,* v. 2, June 1955, p. 247-253.

Corrosion fatigue of 0.15% C steel, with NaCl solution as the corrosive medium. All-weld-metal specimens and specimens from the heat-affected zone were included in the tests. Diagrams, graphs, tables, micrographs, radiograph. 8 ref.

11363* Electrochemical Behavior of Manganese. Potential-pH Equilibrium Diagram of the System Mn-H_2O, at 25 C. **Comportement électrochimique du manganèse. Diagramme d'équilibre tension-pH du système Mn-H_2O, a 25° C.** (French.) A. M. Moussard, J. Brenet, F. Jolas, M. Pourbaix, and J. van Muylder. *Centre Belge d'Etude de la Corrosion, Rapport Technique,* no. 18, 1954, 7 p. (TA462 C33r)

General properties of Mn, its oxides and solutions; behavior of Mn O_2 in voltaic cells. Diagram. 18 ref.

11364* Use of Polarization Curves for the Study of Corrosion and Protection of Iron in the Presence of Chlorides. Phosphatization and Oxidizing Phosphatization. **Utilisation de courbes de polarisation pour l'étude des circonstances de corrosion et de protection du fer en présence de chlorures. Phosphatation et phosphatation oxydante.** (French.) Anwar Mahmoud Abd El Wahed and Marcel Pourbaix. *Centre Belge d-Etude de la Corrosion, Rapport Technique,* no. 19, 1954, 8 p. (TA462 C33r)

Influence of different quantities of disodium phosphate and K_2CrO_4 on the behavior of Fe and different steels in the presence of chlorinated solutions of bicarbonate. Tables, graphs, photographs. 7 ref.

11365* Reports of the Cebelcor Research Meeting, April 13-14, 1955. **Journées d-etudes du CEBELCOR. (13 et 14 avril 1955).** (French.) *Centre Belge d'Etude de la Corrosion, Rapport Technique,* no 22, 1955, 80 p. (TA462 C33r)

Report on the activity and progress of research at the Belgium Corrosion Research Center in the fields of electrochemical behavior of metals, cathodic protection, scaling, direct aid to industry, and international cooperation in research. Graphs, diagrams, photographs.

11366 Nionel Reference Sheet. II. W. Z. Friend. *Chemical Engineering Progress,* v. 51, June 1955, p. 296.

Corrosion behavior in several media; compared with other alloys in 85% phosphoric acid. (To be continued.)

11367 The Use of Non-Ferrous Metals in Domestic Water Supply. Hector S. Campbell. *Chemistry & Industry,* 1955, no. 25, June 18, p. 692-698.

Performance of galvanized steel, Pb, Al, and Cu pipes and tanks is considered. 16 ref.

11368 Acid Corrosion Inhibition by High Molecular Weight Nitrogen-Containing Compounds. Raymond A. George and Norman Hackerman. *Corrosion,* v. 11, June 1955, p. 249-253; disc., p. 254.

Adsorption from benzene solution onto steel powder and the effect of this treatment on the reactivity of the steel in aqueous acid solution were determined. Graphs, tables. 15 ref.

11369 Use of the Pearson Bridge in Corrosion Inhibitor Evaluation. E. J. Simmons. *Corrosion*, v. 11, June 1955, p. 255-260.

Basic operation of the Pearson bridge, a circuit for measurement of electrode potentials of remote electrodes in the presence of current flow, is described. Photograph, graphs, diagrams. 3 ref.

11370 Control of Internal Corrosion of a Products Pipe Line System. P. L. DeVerter and A. W. Jasek. *Corrosion*, v. 11, June 1955, p. 261-265; disc., p. 265-266.

Considers the matter of controlling internal corrosion in a pipe line system and reports experience with two control methods. Tables, diagram. 8 ref.

11371 Special Corrosion Problems of Electric Utility Systems. C. F. Avila and A. B. Jones. *Corrosion*, v. 11, July 1955, p. 291-294.

Causes of several cases of corrosion in the outside plant of electric utilities and remedies adopted for mitigation, including corrosion problems involving corrosion cracking, galvanic action, ground line corrosion of standpipes, water pockets, horizontal surfaces, joints, concrete corrosion of Pb, nitrous oxide attack where corona forms. Specifications and details for construction and protection of a Zn sprayed subway transformer tank are given. Photographs, tables, diagrams.

11372 Carbon Anode Installed in Electric Cable Conduit. Howard L. Davis, Jr. *Corrosion*, v. 11, July 1955, p. 295-298.

Description of a high amp.-yr. impressed anode consisting of graphite rods connected to an insulated header wire. Photographs, diagrams, tables, graph.

11373 Construction Materials for Liquid Sodium Systems. E. G. Brush. *Corrosion*, v. 11, July 1955, p. 299-302; disc., p. 302-303.

Resistance of alloys to attack by Na. Selection of materials of construction that will give satisfactory service in high temperature Na systems. Diagrams, graphs, micrographs.

11374 Severe Pitting of Stainless (18-8) Steel in Hot Chloride Dye-Baths. Frank N. Speller. *Corrosion*, v. 11, July 1955, p. 303.

Details of attack on welded and cast stainless dyeing equipment. Addition of about 500 p.p.m. $NaNO_3$ or $NaCrO_4$ to the dye bath and scouring water before salting minimized further damage. Micrograph.

11375 On the Passivity of Iron. Karl Friedrich Bonhoeffer. *Corrosion*, v. 11, July 1955, p. 304-308. (Translated from *Zeitschrift für Metallkunde*, v. 44, no. 3, Mar. 1953, p. 77-81.)

Previously abstracted from original. See item 4033, v. 2, May 1953.

11376 Filiform Corrosion Products on Iron Immersed in Brine. P. F. Thompson and K. F. Lorking. *Corrosion*, v. 11, July 1955, p. 309-311.

A new type of filiform corrosion pustule was observed on steel test specimen immersed in a commercial refrigerating brine containing chromate as a corrosion inhibitor. These filaments were secondary corrosion products growing from primary hemispherical pustules on the metal surface. The mechanism of the growth of the filaments is discussed. Micrographs. 6 ref.

11377 Cast Irons in High Temperature Service. Richard J. Greene and Frederick G. Sefing. *Corrosion*, v. 11, July 1955, p. 315-321.

Oxidation resistance of cast irons in grate bars and furnace doors. Graphs, micrographs, photographs, tables. 5 ref.

11378* Corrosion in the Brewery. I. The Brewhouse. D. H. Edmonds. *Corrosion Prevention and Control*, v. 2, June 1955, p. 21-26.

Deals with the corrosive influences to be found in breweries, bottling stores, and maltings, and with the methods by which they are or may be controlled. Photographs. (To be continued.)

11379 Magnesium Anodes in a Chemical Plant. Oliver Osborn. *Corrosion Technology*, v. 2, June 1955, p. 170-173.

Use of Mg anodes in structures handling large vol. of sea water and brine, both static and in motion. Diagrams, photographs. 1 ref.

11380 Corrosion in the Tannery. F. E. Humphreys. *Corrosion Technology*, v. 2, June 1955, p. 174-176.

Describes metals used for different tanning processes and methods of protecting structural steelwork. Photographs. 21 ref.

11381 Corrosion in the Petroleum Industry. II. F. H. Garner and A. R. Hale. *Corrosion Technology*, v. 2, June 1955, p. 177-180.

Corrosion of condensing and cracking equipment. Attack of pipes and tanks by sulfuric and phosphoric acids. Photographs. 9 ref. (To be continued.)

11382 The Effect of Cobalt on the High Temperature Oxidation of Nickel. S. F. Frederick and I. Cornet. *Electrochemical Society, Journal*, v. 102, June 1955, p. 285-291.

Nickel-Co alloys of high purity, in sheet form, were oxidized in air at temperatures ranging from 800 to 1400 C to determine the rate of oxidation. Tables, graphs, micrograph. 14 ref.

11383 Kinetics of Surface Reactions of Metals. I. Iron. Donald M. Sowards and Norman Hackerman. *Electrochemical Society, Journal*, v. 102, June 1955, p. 297-303.

Reaction of Fe with dilute, aqueous acetic acid was studied in a closed system with a N atmosphere at 34 C. Extent of reaction, determined gravimetrically, was found to be directly proportional to exposure time. Diagrams, graphs, tables. 24 ref.

11384 The Difference Effect on Aluminum Dissolving in Hydrofluoric and Hydrochloric Acids. M. E. Straumanis and Y. N. Wang. *Electrochemical Society, Journal*, v. 102, June 1955, p. 304-310.

Positive difference effect was observed during dissolution of high purity Al coupled with Pt in 0.05, 0.1, 0.25, 0.5, 0.75, 1.0, and 2.0 hydrofluoric acid at 25 C. The effect was directly proportional to the galvanic current up to 60 milliamp. per sq. cm., being nearly independent of the concentration of the acid. Tables, graphs, diagram. 22 ref.

11385 Mathematical Studies of Galvanic Corrosion. II. Coplanar Electrodes With One Electrode Infinitely Large and With Equal Polarization Parameters. James T. Waber and Marshall Rosenbluth. *Electrochemical Society, Journal*, v. 102, June 1955, p. 344-353.

Expressions for potential and current density distribution were derived for two mathematically similar corrosion problems: tiny anodes buried in infinite cathodes, and tiny foreign cathodic inclusions in a metal. Table, graph, diagrams. 15 ref.

11386 Cathodic Protection of Ships: Experience With Laid-Up Ships of Reserve Fleet. L. T. Carter and J. T. Crennell. *Engineering*, v. 179, June 3, 1955, p. 689-691.

Discussion of Zn protectors, wet sandblasting, cathodic protection and paint, anode material and position, and advantages of flame scaling.

11387* Bolt Materials for Underground Use. *Gas Age*, v. 115, June 2, 1955, p. 38-39.

Addition of small amount of Cu, Ni, or Cr appears to offer promise. Some bolt materials can be protected against corrosion by making them cathodic to the structures which they fasten. Photographs, table. 3 ref.

11388 Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 91A-92A.

Procedures for stress-corrosion tests. Photographs, diagrams.

11389 Electrochemical Principles of Metallic Coatings. I. Electrochemical Principles of Corrosion. L. L. Shreir. *Industrial Finishing, (London)*, v. 8, May 1955, p. 261 + 4 pages.

Dry and wet corrosion; potentials of corroded metals; electrochemical cells. Tables, diagrams. 13 ref.

Corrosion

11390 The Effect of Hydrochloric Acid on the Corrosive Nature of Combustion Gases Containing Sulphur Trioxide. R. W. Kear. *Journal of Applied Chemistry*, v. 5, May 1955, p. 237-242.

Mild steel probes studied from 27 to 150 C; a corrosion peak exists between water and acid dew-points. Acid and Cl increase corrosion. Graphs, diagrams. 7 ref.

11391* Rate of Dissolution of Ti in Phosphoric Acid. **La vitesse de dissolution du titane dans l'acide phosphorique.** (French.) T. G. Owe Berg. *Journal de chimie physique*, v. 52, no. 5, May 1955, p. 363-366.

Rate of dissolution of Ti in 6*N* to 28*N* phosphoric acid at 40, 50, and 60 C is proportional to normality. Graphs. 3 ref.

11392 Metallic Materials Resistant to Molten Zinc. Webster Hodge, R. M. Evans, and A. F. Haskins. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, July 1955, p. 824-832.

Refractory B compounds are shown to resist corrosion by molten Zn. Coatings were made from ferroboron and Mn-B by several methods: welding, hard facing, and pack diffusion. Diagram, tables, photographs, micrographs, graph. 23 ref.

11393 The Pitting of an Aluminium Porringer by Copper-Contaminated Water. J. M. Bryan. *Journal of the Science of Food and Agriculture*, v. 6, June 1955, p. 305-311.

Investigation of rapid pitting of Al when in contact with water contaminated with Cu and in the presence of salt. Tables. 4 ref.

11394 Of What Use Are Chemical Treatments in Controlling Corrosion? S. T. Powell and L. G. von Lossberg. *Mechanical Engineering*, v. 77, June 1955, p. 495-498.

An evaluation of corrosion inhibitors now being offered widely for the solution of numerous problems in the field of steam-generating equipment. Diagram, table, graphs.

11395* The Stress Corrosion of Brass and Its Prevention by Si. **Die Spannungskorrosion von Messing und ihre Verhütung durch Silizium.** (German.) H. Steinle. *Metall*, v. 9, nos. 11-12, June 1955, p. 492-495.

Effect of Si content and degree of cold working on susceptibility to stress corrosion and hardness of brasses. Photographs, graphs, micrographs, tables.

11396* Research on the Corrosion of Tin and on Its Protective Action on Iron. **Ricerche sulla corrosione dello stagno e sulla sua azione protettiva del ferro.** (Italian.) G. Bianchi. *Metallurgia italiana*, v. 47, no. 5, May 1955, p. 216-219.

Corrosion tests on Sn and Sn with steel in solutions of sulfuric, oxalic, tartaric, malic, citric, and salicylic acid, with and without additions of chlorides and sulfates investigates Sn-2% Pb alloys. Graphs, photograph. 1 ref.

11397* Some Observations on Evaluating the Corrosion Behavior of Tin-Plate. **Alcune osservazioni sulla valutazione del comportamento alla corrosione della banda stagnata.** (Italian.) W. E. Hoare. *Metallurgia italiana*, v. 47, no. 5, May 1955, p. 220-221.

Results of tests on the use of tin plate for packaging purposes. Photograph, graphs. 7 ref.

11398* Water Conditioning for Scale and Corrosion Control. Richard B. Conlon. *Paint Industry Magazine*, v. 70, May 1955, p. 34-39, 45-46.

Classifies water by source and describes scaling and corrosion control methods in boiler cooling, and process waters. Table, graphs, photographs.

11399* When Does Cathodic Protection Pay Out? Dean C. Glass. *Pipe Line Industry*, v. 2, June 1955, p. 37-38.

Survey of pipe line companies shows some surprising results as to the cost and pay-out of cathodic protection. Tables.

11400 The Five Per Cent Salt Spray and Its Acetic Acid Modification. Wardley D. McMaster. *Plating*, v. 42, July 1955, p. 904-906.

Use of the acetic acid salt spray as a practical means of evaluating plating quality. Photographs, tables. 4 ref.

11401* Tests Lick Condenser-Tube Corrosion. William D. Bissell. *Power*, v. 99, July 1955, p. 102-104.

A résumé of an analysis of the trouble, testing program, and progress that has been made. Photograph, diagrams.

11402* Contribution to the Chemical Study of the Corrosion of Cu in NaCl Solutions. **Contribution à l'étude chimique de la corrosion du cuivre en solution de chlorure de sodium.** (French.) W. Feitknecht and W. Schütz. *Revue de métallurgie*, v. 52, no. 4, Apr. 1955, p. 327-334.

Observations on aspect of underlying metal after dissolution of the corrosion layers. Rate of etching and its dependence upon concentration. Micrographs, photographs, graphs, tables. 10 ref.

11403* Behavior of Various Inhibitors in Galvanic Corrosion. **Comportamento di vari inibitori nella corrosione galvanica.** (Italian.) G. Bombara and F. Gianni. *Rivista dei Combustibili*, v. 9, no. 4, Apr. 1955, p. 297-313.

Evaluation of inorganic inhibitors by means of galvanic polarization curves. Diagrams, tables, graphs. 7 ref.

11404* Filiform Corrosion—A New Type of Corrosion. **Ueber fadenförmige Korrosionsangriffe (filiform corrosion)—eine neuartige Korrosionsform.** (German.) A. Bukowiecki. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 21, no. 5, May 1955, p. 165-168.

Description of appearance and explanation of formation mechanism of filiform corrosion. Photograph, micrographs, diagram. 5 ref.

11405* Mechanism of Water Pipe Corrosion. Rolf Eliasson and James C. Lamb, III. *Water and Sewage Works (Reference and Data Edition)*, v. 102, June 1, 1955, p. 107R-112R.

Corrosion cells and their formation; rate and distribution of corrosion. Diagrams, tables, graphs.

11406* Stress Corrosion Phenomena in Highly-Stressed Steels Resulting From Diffused Hydrogen. **Spannungskorrosionsartige Erscheinungen an mechanisch beanspruchtem Stahl durch diffundierenden Wasserstoff.** (German.) I. Class. *Werkstoffe und Korrosion*, v. 6, no. 5, May 1955, p. 237-245.

Describes the appearance of cracks of a predominantly transcrystalline character in ordinary and alloyed-heat-treated steels used in condensation units of high pressure plants and experiments made to get these appearances under laboratory conditions. Photographs, diagrams, graphs. 13 ref.

11407 How to Reduce Corrosion in Production Operations. W. C. Koger. *World Oil*, v. 141, July 1955, p. 182 + 6 pages.

Use of cathodic protection to mitigate the corrosion problem has reduced maintenance expenses substantially. Graphs.

11408* The Difference in Potential Within the Passive Layer of Iron. **Zur Potentialdifferenz innerhalb der Passivschicht des Eisens.** (German.) Klaus J. Vetter. *Zeitschrift für physikalische Chemie (Frankfurt)*, v. 4, nos. 3-4, June 1955, p. 165-174.

Theoretical and experimental determination of the potential difference at the oxide-electrolyte phase boundary; discusses Flade potential and corrosion; possible effect of a high-energy oxide or of increased corrosion on the Flade potential. Diagram. 11 ref.

11409* The Passivity of Iron in Neutral and Slightly Acid Solutions. **Zur Passivität des Eisens in neutralen und schwach sauren Lösungen.** (German.) K. G. Weil and K. F. Bonhoeffer. *Zeitschrift für physikalische Chemie (Frankfurt)*, v. 4, nos. 3-4, June 1955, p. 175-191.

Passivation of Fe and its behavior in solutions varying from 2 to 6 pH. Graphs, tables, diagram. 11 ref.

11410* Corrosive and Electrochemical Behavior of Electropolished Aluminum. **Korrozionnoe i elektrokhimicheskoe povedenie elektropolirovannogo aliuminiia.** (Russian.) I. L. Rozenfel'd and P. V. Shchigolev. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 4, Apr. 1955, p. 668-670.

Role of oxide film in the increased corrosion resistance of electropolished Al; advantages of electropolished over mechanically polished Al subjected to Na_2SO_4 and NaCl solutions; effect of Cu, stainless steel, Zn, and Mg in contact with Al. Cathodic polarization. Graphs. 1 ref.

See also:

11556 (photography of corrosion specimens)
11975 (corrosion resisting alloys)

ELECTRICAL ENGINEERING

11411* Thickness and Piercing Voltage of an Anodized Coating. **Spessore e tensione di perforazione di uno strato di ossido anodico.** (Italian.) A. Prati. *Alluminio*, v. 24, no. 2, Mar. 1955, p. 111-119.

Description of the electric equipment employed to check the electrical properties of an anodized layer. Diagrams, tables, graphs. 7 ref.

11412* **Aluminum in Electrical Engineering.** C. H. E. Ridpath. *Aluminium Courier*, 1955, no. 30, June, p. 3-6.

Used in all-Al and steel-cored conductors, cables for power, aircraft, and communication, gas and oil pressure noses, busbars, and many other applications. Table, photographs.

11413* Computation of Ridge-Wave Guides. **Die Berechnung von Steghohlleitern.** (German.) Hans-Georg Unger. *Archiv der elektrischen Übertragung*, v. 9, no. 4, Apr. 1955, p. 157-161.

Calculates the cutoff frequency and characteristic impedance of cross sections of ridge wave guides for which the known formulas are no longer applicable, and thus gives design data for ridge wave guides of any desired cross section. Diagrams, graphs. 4 ref.

11414* Determination of Frequency Characteristic and Phase Constant of a Network With Any Attenuation Curve. **Zur Bestimmung von Frequenz-Charakteristik und Phasenmass eines Netzwerks bei beliebig vorgegebener Dämpfungskurve.** (German.) Hans Kaufmann. *Archiv der elektrischen Übertragung*, v. 9, no. 4, Apr. 1955, p. 192-198.

Method of logarithmic plotting, for the graphic representation of the frequency response of a network, is used for approximating a given attenuation characteristic by that of a realizable network. Graphs, table. 4 ref.

11415* A Quasistatic Universal Instrument for Measuring Direct- and Alternating Currents. **Ein quasistatisches Vielfach-Messgerät für Gleich- und Wechselspannungsmessung.** (German.) Kurt Müller-Lübeck. *Archiv für technisches Messen*, 1955, no. 232, May, p. 113-116.

Principle, design, and operation of handy, practical non-dissipative device with cathode amplifier for measuring voltages, resistances, and capacitances with the aid of d.c. and a.c. Diagrams, graphs.

11416* Economic Operation of Generators. **Generátorok gazdaságos üzemeltetése.** (Hungarian.) Tamás Káldor. *Elektrotechnika*, v. 48, no. 5, May 1955, p. 155-161.

Life of the stator and rotor can be determined by adding the partial agings of the different load periods. Graphs. 2 ref.

11417* Cooling Conditions and Heating of Electrical Machines at High Altitudes. **Kühlungsverhältnisse und Erwärmung elektrischer Maschinen bei Aufstellung in grossen Höhen.** (German.) Rudolf Caser and Karlheinz Lutz. *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 11, June 1955, p. 392-394.

Effect of pressure and density of atmosphere on the temperature and thermal properties of cooling agents; linear correlation of altitude to temperature change; effect of altitude on insulators. Table, graph. 4 ref.

11418* Rectifiers. **Stromrichter.** (German.) Wilhelm Ostendorf and Wilhelm Nowag. *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 12, June 1955, p. 407-411.

Review of different types of modern rectifiers. Photographs, diagrams.

11419* **A New Idea in Circuit Breakers.** J. P. Skillen and D. H. McKeough. *Engineering Journal*, v. 38, June 1955, p. 747-752.

Development of a circuit breaker which is economical to build, uses compressed air as a dielectric, and is acceptable to the switching engineer and station operator. Graphs, photographs, diagrams, oscillogram.

11420 Characteristics and Calibration of Bimetal Releases and Relays. H. Haas. *Engineers' Digest*, v. 16, June, 1955, p. 281-284. (From *Siemens Zeitschrift*, v. 29, no. 2, Feb. 1955, p. 61-68.)

Operating characteristics effect of working temperature; influence of ambient temperature, calibration of bimetal relays, and types of material used in bimetallic releases. Graphs.

11421 The Selection and Application of Saturable Reactors. D. E. Musgrave. *Industrial Heating*, v. 22, May 1955, p. 926 + 9 pages.

Explanation of reactors and how they can be used to advantage for load control. Diagrams, photographs, graphs, tables.

11422 New Epoxy-Bonded Mica Insulation. *Materials & Methods*, v. 41, June 1955, p. 112-113.

Thermal, chemical, mechanical, and electrical properties superior to those of other available types of insulation. Photograph, table, graph.

11423* **Aluminum-Sheathed Power Cable.** W. A. Del Mar and E. J. Merrell. *Power Apparatus and Systems*, 1955, no. 18, June, p. 292-298; disc., p. 298-304.

Methods of fabrication used in producing communication and power cable, such as; billet extrusion, joining of Al sheath, use of sinking dies, cable bend testing, and corrosion protection of wipes and sheath. Photographs, graphs, tables. 17 ref.

11424 Synthesis of RC Networks. Harold J. Smead. *Purdue University Engineering Bulletin, (Engineering Experiment Station Research Series No. 123)*, v. 39, Jan. 1955, 207 p. (TA21 P97.2r)

Objectives of the manual are collection of known synthesis procedures under a common system of terminology and notation; development of a certain amount of insight into the procedures, what the procedures and mathematical manipulations are doing for the designer; development of new procedures to fill as many gaps as possible. Diagrams, graphs. 16 ref.

11425 The Effects of Conductor Temperature on the Quality of Extruded Vinyl Wire Insulation. E. E. Griesser and M. M. Suba. *Rubber Age*, v. 77, June 1955, p. 391-398.

Describes a series of accelerated test methods. Graphs, photographs.

11426* Measuring Dielectric Constants by Dissociating Natural Frequencies. **Messung von Dielektrizitätskonstanten durch Aufspaltung entarteter Eigenfrequenzen.** (German.) Manfred Schröder. *Zeitschrift für angewandte Physik*, v. 7, no. 4, Apr. 1955, p. 169-174.

Cavity-resonator method of measuring dielectric constants and loss angles. Diagrams, photographs, tables. 4 ref.

Books and Miscellaneous Publications

11427 Analysis of Feedback Control Systems. Robert A. Bruns and Robert M. Saunders. McGraw-Hill Electrical and Electronic Engineering Series. 383 p. 1955. McGraw-Hill, New York. (TJ213 B83a)

Components; theory; applications.

11428 Automatic Voltage Regulators and Stabilizers. G. N. Patchett. 355 p. 1955. Pitman Publishing Corp., New York. (TK2851 P27a)

Covers all types of regulators from those of a few watts output, commonly feeding electronic devices, to those controlling thousands of kw. and used on large power systems. Discusses the basic principles as well as the actual regulators and stabilizer circuits.

11429 Precision Electrical Measurements. Papers individually paged. 1955. Her Majesty's Stationery Office, London. (TK275 G79.5p)

Symposium on measurement of capacitance, inductance, and dielectric and magnetic properties; high-voltage techniques.

Electrical Engineering

See also:

11335 (evaluation of insulating coatings)
11371 (corrosion in electric systems)
11372 (cathodic protection of electric cables)
11617 (electrical vibration meter)

ELECTROCHEMISTRY AND ELECTROPROCESSES

11430* Several Processes for Determining the Quality of Eloxation Films. **Einige Verfahren zur Bestimmung der Güte von Eloxalschichten.** (German.) F. Baumann and R. Lattey. *Aluminium*, v. 31, no. 5, May 1955, p. 199-204.

Methods of measuring thickness, corrosion and wear resistance, porosity, and electrical properties of anodic coatings on Al. Photographs, tables, graphs. 14 ref.

11431 Hardness of Hard Chromium Plates. H. Arend. *Henry Brutcher Translation No.* 3427, 10 p. (Abridged from *Metalloberfläche*, v. 3, no. 5, 1951, p. 72B-76B.) Henry Brutcher, Altadena, Calif.

Deposition conditions for α, β, and γ-Cr; also for mixed structures. Significance of type of current used; effect of chopped direct current upon nature of hard Cr deposits. Graphs, table. 18 ref.

11432 Selection of the Most Favorable Conditions for Porous Chromium Plating. G. K. Shvyryaev and M. A. Shluger. *Henry Brutcher Translation No.* 3482, 9 p. (Condensed from *Vestnik Mashinostroeniya*, v. 34, no. 5, 1954, p. 64-68.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 15665, v. 3, Nov. 1954.

11433 On the Adhesion of Nickel-Chromium Electrodeposits. A. von Krusenstjern. *Henry Brutcher Translation No.* 3489, 3 p. (From *Metalloberfläche*, v. 5, no. 10, 1953, p. 153B-154B.) Henry Brutcher, Altadena, Calif.

Effect of thoroughness of degreasing and amount of time elapsed between grinding and polishing, and degreasing only upon the adhesion of Ni-Cr plates. Table, photographs.

11434 The 'D' Chromium Plating Process. A. Kutzelnigg. *Henry Brutcher Translation No.* 3491, 7 p. (Abridged from *Metalloberfläche*, v. 5, no. 10, 1953, p. 156B-160B.) Henry Brutcher, Altadena, Calif.

Description of tetrachromate-based 'D' Cr plating process and its application in cases where both bright and hard Cr plating fail. Photographs, micrographs. 4 ref.

11435 Study of the Effect of High-Frequency Alternating Current on the Electrodeposition of Chromium. R. Bilfinger. *Henry Brutcher Translation No.* 3492, 10 p. (From *Archiv für Metallkunde*, v. 2, no. 4, 1948, p. 131-135.) Henry Brutcher, Altadena, Calif.

Effect of current density upon current efficiency and throwing power of Cr plating baths containing various quantities of foreign acid, in the presence and absence of H.F. a.c. Micrographs, tables, photographs, circuit diagram.

11436 Investigation of Electrobrightening of Metals. P. V. Shchigolev and N. D. Tomashov. *Henry Brutcher Translation No.* 3502, 7 p. (Condensed from *Doklady Akademii Nauk SSSR*, v. 100, no. 2, 1955, p. 327-330.) Henry Brutcher Altadena, Calif.

Previously abstracted from original. See item 6632, v. 4, May 1955.

11437* Reduction of Acetophenone by an Electrolytic Method Using Raney Nickel as Catalyst. (English.) Buhei Sakurai and Toshio Arai. *Chemical Society of Japan, Bulletin*, v. 28, no. 2, Mar. 1955, p. 93-94.

Methylphenylcarbinol prepared in an alkaline electrolyte with a Pb or Cu cathode. 6 ref.

11438* Mechanism of Zn Electropolishing. **O mekhanizme elektropolirovki tsinka.** (Russian.) A. T. Vagramian and A. P. Popkov. *Doklady Akademii Nauk SSSR*, v. 102, no. 3, May 21, 1955, p. 547-549.

Relation of anode polarization and surface glitter to electrolysis time; contrast with mechanism of Ag electropolishing. Polarization curves. 8 ref.

11439* Recent Developments in Chromium Plating. H. Silman. *Institute of Metal Finishing, Bulletin*, v. 5, Spring 1955, p. 33-44.

Solutions, catalysts, baths, processes, barrel Cr plating, tampon finishing, and plant requirements. Graphs. 17 ref.

11440* Practical Bright Nickel Plating. T. E. Such. *Institute of Metal Finishing, Bulletin*, v. 5, Spring 1955, p. 45-64.

The advantages and disadvantages of plating, as compared with dull Ni plating; merits of various plating solutions and methods for their control and purification; recommended cleaning cycles. Tables, graphs, diagram. 17 ref.

11441* Some Aspects of Sulphuric Acid Anodising to Specifications D.T.D. 910C. V. F. Henley. *Institute of Metal Finishing, Bulletin*, v. 5, Spring 1955, p. 65-70.

Technical difficulties in meeting British specifications include: factors influencing the choice of the electrolyte concentration, the importance of agitating the electrolyte, "spotting out" of dyed coatings caused by galvanic action, dimensional changes occuring during anodizing, and a proposed method for maintaining the original dimensions. 3 ref.

11442 Anodized Coatings: What They Are—How They Behave. II. C. C. Cohn. *Iron Age*, v. 175, June 2, 1955, p. 95-98.

Discussion of thickness tests, equal diffusion rates, film properties, and oxide film growth. Photographs.

11443 High-Output Plating Machine Incorporates Job Shop Flexibility. Alfred D'Agostino. *Iron Age*, v. 175, June 9, 1955, p. 75-77.

All mechanical movements are powered from a single integrated chain drive. The drive is self-compensating in that the timing function will not be affected by the normal wear of its components. Photographs, diagrams.

11444 Metal Finishing 1855 to 1955. *Iron Age (100th Anniversary Issue)*, v. 175, June 1955, p. 2G-16G.

Past, present, and possible future trends in electroplating, cleaning, phosphating, and porcelain enamels. Photographs.

11445* Copper Plating of Mirrors Silvered by the Glazing Method. **Omednenie zerkal, posrebrennykh metodom poliva.** (Russian.) R. G. Lepilina and M. T. Belousov. *Legkaia Promyshlennost'*, v. 15, no. 5, May 1955, p. 41-43.

Conditions of galvanic Cu plating are prescribed; current density, etc. Thickness and quality of the resulting Cu film.

11446 Design for Plating. J. B. Mohler. *Machine Design*, v. 27, June 1955, p. 165-168.

Types of coating, coating specifications, variation in deposit thickness, plating corners, and engineering uses of plating are discussed. Tables, diagrams, photographs. 4 ref.

11447 Standardization of Chromium Bath Tests on a Bent Cathode in the Hull Cell. II. Study of C.P. Variations Under Simple Conditions. Robert H. Rousselot. *Metal Finishing*, v. 53, June 1955, p. 99-102.

Method of plotting the variations of the covering power with a satisfactory degree of precision, taking into account the factors relating to the base metal and progressively varying the factor concerning the bath. Diagram, table, graphs. 7 ref.

11448 Finishing Aluminium. G. E. Gardam and G. L. Jones. *Metal Industry*, v. 86, June 3, 1955, p. 476-479.

Review of well established and more recent metal finishing methods for Al. Photographs. 26 ref.

11449* Modern Processes of Producing Tin-Plated Sheet Metal. **Moderne Verfahren der Weissblechherstellung.** (German.) B. Keysselitz. *Metall*, v. 9, nos. 11-12, June 1955, p. 490-491.

Methods and equipment of Sn-plating sheet Fe in "Ferrostan", halogen, and alkaline baths. Diagrams, photographs.

11450* Galvanic Nickel Deposits From Chloride and Sulfate Solutions. **Galvanische Nickelniederschläge aus Chlorid- und Sulfatlösungen.** (German.) Ernst Raub. *Metalloberfläche*, Ausgabe A, v. 9, no. 6, June 1955, p. 88-93.

Comparison of $NiCl_2$ with $NiSO_4$ from the standpoint of economy of Ni plating and hardness of Ni deposit. Graphs, tables. 6 ref.

11451* Simultaneous Electrodeposition of Two Metals With Special Reference to Tin Alloys. **L'elettrodeposizione simultanea di due metalli con speciale riferimento alle leghe di stagno.** (Italian.) E. S. Hedges. *Metallurgia italiana*, v. 47, no. 5, May 1955, p. 197-199.

Theoretical and practical aspects; examples of Sn with Cu, Zn, Ni, Co, Pb, and Cd. 4 ref.

11452* Research on the Electrochemical Behavior of Tin. **Ricerche sul comportamento elettrochimico dello stagno. I.** (Italian.) R. Piontelli, G. Serravalle, and R. Ambrosetti. *Metallurgia italiana*, v. 47, no. 5, May 1955, p. 200-203.

Results of experiments on kinetic and structural aspects of electrodeposition of Sn alloys by measuring polarization, anodic and cathodic voltages. Diagrams, tables, graphs. 4 ref.

11453* Considerations on the Electrodeposition of Alloys. **Considerazioni sull'elettrodeposizione di leghe.** (Italian.) R. Piontelli. *Metallurgia italiana*, v. 47, no. 5, May 1955, p. 204-209.

Formation of alloys by electrodeposition; kinetic and theoretical aspects. Diagram. 4 ref.

11454* Compared Fields of Application of Electrolytic and Hot-Dip Tinplate. **Campi di applicazione comparati della banda stagnata elettrolitica e della banda stagnata per immersione.** (Italian.) W. R. Lewis. *Metallurgia italiana*, v. 47, no. 5, May 1955, p. 210-215.

Use of Sn plate in drawing, shearing, welding, and lacquering processes. Micrographs, photograph, diagram, graph.

11455* **Chrome Plating for the Small Shop.** J. B. Mohler. *Metalworking Production*, v. 99, Apr. 15, 1955, p. 677-679.

Advantages of setting up a chrome-plating department in a small shop. Diagrams, graphs.

11456* Contribution to the Study of Electrolysis in Very Concentrated Solution. Example of Electrolytic Polishing. **Contribution à l'étude de l'électrolyse en solution très concentrée. Exemple du polissage électrolytique.** (French.) Philippe Brouillet. *Métaux, Corrosion-Industries*, v. 30, no. 356, Apr. 1955, p. 141-154.

Discusses phenomena at the electrodes during electrolysis based on existence of a layer of adsorbed ions at the surface of the metal. Diagrams, tables. 34 ref. (To be continued.)

11457 Electrolytically Formed Coating for Magnesium Alloys. *National Bureau of Standards, Technical News Bulletin*, v. 39, June 1955, p. 77-79.

Salt spray resistant surface on Mg by a.c. deposition in a simple electrolyte. Tables, photographs.

11458 Electrodeposition of Rhodium. Edward A. Parker. *Plating*, v. 42, July 1955, p. 882-892.

Methods of purification and applications which depend on decorative white finish, hardness, corrosion resistance, optical reflectivity, low electrical resistance and combinations are discussed. Tables, diagrams. 13 ref.

11459 Chromium Without Microporosity Plated Directly Onto Base Metal. *Precision Metal Molding*, v. 13, June 1955, p. 67-68.

Plating process that permits the deposit of a dense, non-porous layer of Cr directly onto the base metal, such as die cast alloys, steels, Cu, etc. Photographs.

11460 pH for the Electroplater. J. B. Mohler. *Products Finishing*, v. 19, July 1955, p. 32 + 8 pages.

Importance of pH determination in terms of its effect upon chemical balance, decomposition, bath control, and plating quality. Table, graph.

11461 Fine-Scale Structures Produced on Aluminium by Electropolishing or Etching. N. C. Welsh. *Research (Supplement)*, v. 8, June 1955, p. 28-29.

A study of the effects of anodic treatment in several electrolytes under conditions which would produce in some cases polished surfaces and in others oxidation with little polishing action. Graph, micrograph. 11 ref.

11462* Production of Extremely Thin Metal Wires. **Die Herstellung extrem dünner Metalldrähte.** (German.) H. Bittel. *VDI Zeitschrift*, v. 97, nos. 15-16, May 15, 1955, p. 486-488.

Describes electrolytic methods of reducing the diameters of wires. Diagrams, graphs. 7 ref.

11463* Electrolysis With Constant Potential. **Zur Elektrolyse bei konstantem Potential. II.** Investigations of the Kinetics of the Deposition of Simple Zinc and Complex Silver Ions. **Untersuchungen über die Kinetik der Abscheidung einfacher Zink- und komplexer Silber-Ionen.** (German.) W. Vielstich and H. Gerischer. *Zeitschrift für physikalische Chemie (Frankfurt)*, v. 4, nos. 1-2, May 1955, p. 10-23.

Includes diagrams, graphs. 11 ref.

11464* Charge-Free Electrodes in Electrochemistry. **Ladungsfreie Elektroden in der Elektrochemie.** (German.) H. J. Oel and H. Strehlow. *Zeitschrift für physikalische Chemie (Frankfurt)*, v. 4, nos. 1-2, May 1955, p. 89-115.

Includes tables, diagrams. 50 ref.

11465* Effect of Electropolishing on the Physicochemical Properties of Pure Aluminum Surfaces. **Vliianie elektropolirovki na fiziko-khimicheskie svoistva poverkhnosti chistogo aliuminiia.** (Russian.) P. V. Shchigolev. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 4, Apr. 1955, p. 682-684 + 1 plate.

Coefficient of light reflection and the electrical resistance of the surface of electrolytically polished Al. Electronographic and X-ray studies of the oxide layer structure on electropolished Al, and comparisons made with mechanical processes. Graphs, micrographs. 3 ref.

See also:

11312 (aluminum plating)
11410 (aluminum electropolishing)
11411 (electrical properties of anodic coating)
11595 (electroplating instrumentation)
11787 (effect of anodizing on fatigue of magnesium alloys)
12144 (electrodeposition of metal powders)

ELECTRONICS

11466* Tensor Analysis of Regenerative Transistor Circuits. **Tensoranalysis von Transistor-Rückkopplungsschaltungen.** (German.) Gerhard Ledig. *Archiv der elektrischen Übertragung*, v. 9, no. 4, Apr. 1955, p. 162-167.

An outline of the advantages of tensor analysis in the analytical treatment of transistor circuits. Diagrams. 4 ref.

11467* The Electron Transit Time in a Plane Space-Charge Diode. **Die Elektronenlaufzeit in einer ebenen Raumladungsdiode.** (German.) Hans Paucksch. *Archiv der elektrischen Übertragung*, v. 9, no. 4, Apr. 1955, p. 171-176.

Calculates all transit times that may possibly occur for a plane-parallel diode in which the electrons leave the cathode with a Maxwell velocity distribution. Graphs, tables. 8 ref.

11468* Theory of the Transmitting in Finite Electron Transit Times. **Beitrag zur Theorie der Sendetriode bei endlichen Elektronenlaufzeiten.** (German.) Friedrich Hülster. *Archiv der elektrischen Übertragung*, v. 9, no. 5, May 1955, p. 207-220.

Electronic effects in transmitting triodes in the case of finite transit times. Graphs, table. 4 ref.

11469* Consideration of the Transition Range Between Flow and Barrier Region in the Equivalent Circuit Diagram for Slow Germanium Diodes. **Die Berücksichtigung des Übergangsgebiets zwischen Fluss- und Sperrgebiet im Ersatzschaltbild für träge Germaniumdioden.** (German.) Gerhard Kohn. *Archiv der elektrischen Übertragung*, v. 9, no. 5, May 1955, p. 241-245.

An equivalent circuit diagram is derived from pulsed measurements which applies for the high controlling voltages used in pulsed operation. Diagrams, graphs. 2 ref.

Electronics

11470* Broad-Band Amplifiers. **Breitband-Verstärker. IV.** Multistage Amplifiers. **Mehrstufige Verstärker.** (German.) Hanswerner Pieplow. *Archiv für technisches Messen*, 1955, no. 232, May, p. 117-120.

Discussion of most important means for expanding the frequency range of multistage amplifiers by suitable design of coupling networks and by the use of feedback couplings. Diagrams, graphs.

11471 Transistors in the 4A Crossbar System. P. Mallery. *Bell Laboratories Record*, v. 33, June 1955, p. 215-219.

Use in the card translator, the machine that helps find idle trunks in the 4A crossbar system for switching long distance telephone calls. Photographs, diagrams, graph. 2 ref.

11472 Semiconductor Diodes. Donald K. Wilson. *Bell Laboratories Record*, v. 33, June 1955, p. 227-231.

Use in high-speed, H.F. electronic switching circuits. Photographs, diagrams. 5 ref.

11473 The Bell Solar Battery. Daryl M. Chapin, Calvin S. Fuller, and Gerald L. Pearson. *Bell Laboratories Record*, v. 33, July 1955, p. 241-246.

Principles; Si semiconductors; performance. Photographs, graphs, diagram.

11474 Electrical Contacts for Transistors and Diodes. Maynard C. Waltz. *Bell Laboratories Record*, v. 33, July 1955, p. 260-263.

Contact types, uses and advantages. Photographs, diagrams.

11475* Multi-Electrode Counting Tubes. K. Kandiah and D. W. Chambers. *British Institution of Radio Engineers, Journal*, v. 15, Apr. 1955, p. 221-232; disc., p. 232.

Possible uses of hot and cold cathode decimal counters in systems other than straightforward counting. Diagrams. 14 ref.

11476 Silicon Power Rectifiers. William E. Slusher. *Electrical Manufacturing*, v. 55, June 1955, p. 120-123.

High efficiency, low inverse drop, and wide temperature range are obtained with Si rectifiers. Photographs, graphs.

11477* Effect of a Semiconducting Glaze on the Discharge Phenomena of the Contaminated Surface of Porcelain. **Vliianie poluprovodiashchei glazuri na razriadnye iavleniia po zagriaznennoi poverkhnosti farfora.** (Russian.) Den Du Khvan. *Elektrichestvo*, 1955, no. 5, May, p. 45-49.

Methods of investigating the discharge characteristics of porcelain covered with a semiconductor. Unevenness of distribution of tension over the surface of the porcelain is corrected by the semiconducting glaze. 10 ref.

11478* Silicon Alloy Junction Diodes for Power Supply Application. J. Shields. *Engineer*, v. 199, June 10, 1955, p. 801-803.

Preparation of experimental Si rectifiers and an examination of their characteristics. Photograph, diagram, graphs. 2 ref.

11479* Measurements on Dielectric and Ferromagnetic Materials at Frequencies of Around 10,000 Mc. per Sec. **Messungen an dielektrischen und ferromagnetischen Werkstoffen bei Frequenzen um 10 GHz.** (German.) G. Klätte. *FTZ: Fernmeldetechnische Zeitschrift*, v. 8, no. 5, May 1955, p. 256-261.

Apparatus and the methods for measuring the complex relative dielectric constant of solid materials at room temperatures, higher temperatures, and relative permeability constant of ferromagnetic material at room temperatures. Diagrams, photographs, tables, graphs. 5 ref.

11480* Crystal Diodes in Voltage Dividers, Especially for Linearization and Slope Increase of Static and Dynamic Characteristic Curves. **Kristalldioden in Spannungsteilern, insbesondere zur Linearisierung und Versteilerung von statischen und dynamischen Kennlinien.** (German.) H. Meinke and A. Rihaczek. *FTZ; Fernmeldetechnische Zeitschrift*, v. 8, no. 5, May 1955, p. 273-276.

Includes diagrams, graphs. 4 ref.

11481 Equipment of Instrumental Accuracy for Recording and Reproduction of Electrical Signals, Using Cinematographic Film. H. McG. Ross. *Institution of Electrical Engineers, Proceedings*, v. 102, pt. B, no. 3, May 1955, p. 323-339; disc., p. 339-342.

The apparatus offers a significant addition to experimental technique, particularly when used in conjunction with an electronic analogue computer. Diagrams, graphs, circuit diagrams, oscillograms.

11482 A Developmental Pocket-Size Broadcast Receiver Employing Transistors. D. D. Holmes, T. O. Stanley, and L. A. Freedman. *I.R.E., Proceedings*, v. 43, June 1955, p. 662-670.

Describes a pocket-size a.m. broadcast receiver which utilizes eight junction transistors with performance comparable to that of conventional personal receivers. Photographs, diagrams, graphs, table. 3 ref.

11483 An Experimental Automobile Receiver Employing Transistors. L. A. Freedman, T. O. Stanley, and D. D. Holmes. *I.R.E., Proceedings*, v. 43, June 1955, p. 671-678.

Receiver operates directly from the six-volt storage battery without vibrator, power transformer, or rectifier. Photographs, diagrams, graphs. 5 ref.

11484 A Bridge for Measuring Audio-Frequency Transistor Parameters. B. F. C. Cooper. *I.R.E., Proceedings*, v. 43, July 1955, p. 796-805.

Includes diagrams, photograph. 13 ref.

11485 Ultrasonic Cleaning of Miniature Devices. Quentin C. McKenna. *Institute of Radio Engineers, Transactions on Ultrasonic Engineering*, PGUE-3, May 1955, p. 16-22. (TK1 In6.6u)

By irradiating liquid cleaners with appropriately arranged transducers, large vol. of intricate parts can be cleaned. Photographs.

11486 The Univac and Univac Scientific. William Allen and Graham E. Smith. *Instruments and Automation*, v. 28, June 1955, p. 960-969.

A thorough résumé of the computers with emphasis on the real-time features of the latter. Photographs, diagram.

11487 Silicon *n-p-n* Grown Junction Transistors. M. Tanenbaum, L. B. Valdes, E. Buehler, and N. B. Hannay. *Journal of Applied Physics*, v. 26, June 1955, p. 686-692.

Using Ga and Sb as doping agents, single crystals of *n*-type Si were grown containing up to five *p*-regions from 0.0005 to 0.002 in. wide which are suitable for the production of transistors. Diagram, graphs, table, micrographs.

11488 Transparent Phosphor Coatings. F. J. Studer and D. A. Cusano. *Journal of the Optical Society of America*, v. 45, July 1955, p. 493-497.

The properties of nonscattering ZnS phosphor screens are described and their advantages over powder phosphors considered. Diagrams, photographs, graphs, table.

11489* Prohibited and Permitted Bands in Impure Semiconductors and Disordered Alloys. **Bandes interdites et bandes permises dans les semi-conducteurs impurs et les alliages désordonnés.** (French.) J. des Cloizeaux. *Journal de physique et le radium*, v. 16, no. 4, Apr. 1955, p. 320-324.

Limits of permitted energy bands in a unidimensional semiconductor model or model of a disordered alloy, the latter representing a problematical succession of two types of cells. Graph, diagrams. 7 ref.

11490* Study of the Semi-Conductivity of Copper Oxide According to Its Magnetic Behavior Between 80 and 1000 K. **Étude de la semi-conductivité de l'oxyde cuivreux d'après son comportement magnétique entre 80 et 1000°K.** (French.) N. Perakis and A. Serres. *Journal de physique et le radium*, v. 16, no. 5, May 1955, p. 387-394.

Detailed thermomagnetic study of a magnetically pure nonstoichiometric copper oxide. Table, graphs. 7 ref.

11491* Focusing of Waves in Radio Reception. H. V. Griffiths. *Nature*, v. 175, May 28, 1955, p. 948-949.

The signal from Sofia at 9700 kc. shows a 10- to 20-fold increase in field strength at varying intervals. Graphs.

11492 Velocity Analysis of Thermionic Emission From Single-Crystal Tungsten. Andrew R. Hutson. *Physical Review*, v. 98, ser. 2, May 15, 1955, p. 889-901.

Magnetic velocity analysis of the thermionic emission yielded: energy distributions of the emission in various crystal directions, temperature coefficients of work functions, and actual differences in work function between the different directions at thermionic temperatures. Diagrams, graphs, tables. 24 ref.

11493 Plasma Oscillations in Metals. E. N. Adams. *Physical Review*, v. 98, ser. 2, May 15, 1955, p. 947-953.

Self-consistent field treatment of the electronic wave functions of a solid is used as a basis for a theory of plasma oscillations in a metal. 8 ref.

11494* Emitter Efficiency of Junction Transistor. (English.) Toshio Misawa. *Physical Society of Japan, Journal*, v. 10, no. 5, May 1955, p. 362-367.

The emission efficiency of an efficient emitter is calculated in the electrostatic potential scheme by extending the boundary conditions so as to apply to the case of a moderately-high injection level. Diagram, graphs. 3 ref.

11495 Printed Foil Electronic Components. Hubert L. Shortt and Paul Eisler. *Tele-Tech & Electronic Industries*, v. 14, sec. 1, June 1955, p. 102 + 8 pages.

Utilization of printed materials as aircraft de-icing mats, high-wattage resistors, and temperature sensing elements. Photographs, micrographs.

11496 Transistor Operating Points. Robert E. Skipper. *Tele-Tech & Electronic Industries*, v. 14, sec. 1, June 1955, p. 104 + 5 pages.

Design analysis for high-gain, low-noise amplifier stage shows equations may be utilized to predict performance. Diagrams, graphs. 10 ref.

11497 Design of a Computer—Oracle. J. C. Chu. *U. S. Atomic Energy Commission ANL-5368*, Sept. 1954, 127 p. (UF767 Un3.1an)

Includes photographs, diagrams, tables.

11498 A Versatile Laboratory Servo-Amplifier. L. M. Johnson. *U. S. Atomic Energy Commission, DP-112*, Mar. 1955, 11 p. (UF767 Un3.1dp)

Amplifier was developed for use as a laboratory instrument in the design of various electrical servo systems. Tables, photographs, diagrams. 2 ref.

11499* Semiconductor Transformers for Radiant Energy. **Poluprovodnikovye preobrazovateli energii izluchenii.** (Russian.) V. S. Vavilov. *Uspekhi Fizicheskikh Nauk*, v. 56, no. 1, May 1955, p. 111-130.

Possibilities for the utilization of solar and radioactive radiations through direct transformation into electrical energy; possible sources of β-radiation; change in semiconductor porperties under influence of fast electrons. Graphs, table, diagrams. 24 ref.

11500* Wide Range Electrostatic Loudspeakers. II. Problems of Air Loading. P. J. Walker. *Wireless World*, v. 61, June 1955, p. 265-269.

Different requirements of moving-coil and electrostatic drive units. Diagrams, circuit diagrams, graphs. (To be continued.)

11501* Remarks on the Temperature Dependence of the Blocking Current in *p-i-n* Rectifiers. **Bemerkung zur Temperaturabhängigkeit des Sperrstromes bei *p-i-n*-Gleichrichtern.** (German.) *Zeitschrift für angewandte Physik*, v. 7, no. 5, May 1955, p. 240-244.

Discussion based on pair formation according to Schockley-Read's and R. N. Hall's trap model. Diagrams, graph. 9 ref.

11502* The Theoretical Temperature Coefficient of Semiconductors. **Zum theoretischen Temperaturkoeffizienten von Halbleitern.** (German.) Eberhard Groschwitz. *Zietschrift für angewandte Physik*, v. 7, no. 5, May 1955, p. 245-249.

Computation of temperature coefficient of resistance of an electronic semiconductor for the entire perturbance and intrinsic conduction range; effect of the life of the minority carriers on the temperature coefficient of a *p-n* combination. 10 ref.

11503* Effect of Light on the Mechanism of Gas Discharges (Joshi Effect). **Einfluss von Licht auf den Mechanismus von Gasentladungen (Joshi-Effekt).** (German.) S. R. Mohanty. *Zeitschrift für Physik*, v. 140, no. 4, 1955, p. 370-375.

Includes graphs, photograph. 38 ref.

11504* The Effectiveness of Cadmium Selenide Films in the Se Rectifier. **Zur Wirksamkeit von Cadmiumselenidschichten beim Selengleichrichter.** (German.) H. Strosche. *Zeitschrift für Physik*, v. 140, no. 4, 1955, p. 409-413.

Experimental study of the minimum thickness of CdSe indicates that films of monomolecular thickness are sufficient to determine the rectifying properties of Se rectifiers. Graphs, tables. 4 ref.

11505* A Conductivity Detector for Detecting Mol. Rays. **Ein Leitfähigkeitsdetektor zum Nachweis von Molekularstrahlen.** (German.) Gerhard Fricke and Helmut Friedburg. *Zeitschrift für Physik*, v. 141, nos. 1-2, 1955, p. 171-174.

Shows how the great effect of foreign atoms on the conductivity of semiconductors can be used to detect mol. radiation. Graphs. 4 ref.

11506* Variation of the Conductivity of Germanium by an External Electrical Field. **Izmenenie provodimosti germaniia vneshnim elektricheskim polem.** (Russian.) S. G. Kalashnikov and A. E. Iunovich. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 5, May 1955, p. 952-954.

Relation of the variation of conductivity to the induced negative charge on the surface. Graph. 12 ref.

Books and Miscellaneous Publications

11507 Vacuum Technique and Applications. **Le Vide, Technique—Applications.** (French.) Reports Presented at the International Congress Celebrating the Fiftieth Anniversary of the Oxide Cathode. 393 p. 1954. La Société Française des Ingénieurs Techniciens du Vide, Paris. (QD559 C76r)

Contains 26 reports on metal supports, carbonates and deposition techniques, theory of the emission of oxide-coated cathodes, cathode quality, special cathodes, and stability of emissive properties. Most of the papers contain complete English or German translations.

11508 Research Services and Investigations on Subminiature Multielement Diodes and Bistable Elements for Microtronic Circuits. Quarterly Progress Report No. 4, Second Series, Under Contract No. AF 19-(604)-55 for Period July 24 to Oct. 23, 1954. E. B. Dale, M. W. Aarons, M. Pobereskin, J. E. Gates, and C. S. Peet. PB 116260. 30 p. 1954. Library of Congress, Publication Board Project, Washington, D. C.

Metallographic and radioactive tracer methods have been applied to the study of the gold distribution in pulse-welded and d.c.-welded, gold-bonded junctions.

See also:

11039 (telemetering systems for guided missiles)
11582 (electronic equipment)

ENGINEERING ECONOMICS

11509 A Symposium on the Chemical Industry and the St. Lawrence Seaway. *Canadian Chemical Processing*, v. 39, May 1955, p. 29-37.

Three papers cover power, transportation, production, and plant location aspects of the seaway as well as its physical limitations. Photographs.

11510 More Help in Finding Cost Data. James B. Weaver. *Chemical Engineering*, v. 62, June 1955, p. 247-252.

A bibliography and subject index of cost-estimation engineering economics literature for 1954.

11511 How Fast Will Atomic Energy Grow? *Chemical Week*, v. 76, June 11, 1955, p. 44, 46, 48.

Projected growth of at. power in terms of cumulative heat capacity in millions of kc. Tables.

11512 The Small Manufacturer in the Chemical Industry: His Position, Problems and Future. Nathan D. Froot. *Chemical Week*, v. 76, June 18, 1955, p. 38 + 9 pages.

Study of the subject's struggle for survival. Table, diagram.

11513 Chemical Statistics of the Chemicals and Allied Products Industries in Canada. Donald W. Emmerson. *Chemistry in Canada*, v. 7, June 1955, p. 27-47.

Includes tables, graphs, photographs.

Engineering Economics

11514* **Power—Past, Present and Future.** J. Eccles. *Engineering Journal*, v. 38, June 1955, p. 779-783, 787.

Some general observations on power engineering, improved technology, world supply of fuel, alternatives to fossil, water power, solar and nuclear energy.

11515 Recent Advances in Steel Technology and Market Development. *Engineers' Digest*, v. 16, June 1955, p. 267-270.

A report to make available to those interested in steel from the commercial and essentially lay angle a straightforward account of some of the more promising developments, many of which are discussed in their broad economic setting.

11516 Price and Production Data—1855 to 1955. *Iron Age (100th Anniversary Issue)*, v. 175, June 1955, p. 1M + 26 pages.

Statistics on ferroalloys, non-ferrous alloys, pig iron, steel, and scrap metals. Photographs, tables, graphs.

11517* The Upward Tendency of World's Steel Industry. **Die Weltstahlindustrie im Auftrieb.** (German.) Fritz Grotius. *Stahl und Eisen*, v. 75, no. 10, May 19, 1955, p. 613-618.

Discussion of the evolution of young steel producing countries. Melting furnaces. The bottleneck of scrap supply. Tables.

11518* Analysis of Conversion and Processing Cost in Steel-Works as a Guide to Technical Rationalization. **Die Analyse der Umwandlungs- und Verarbeitungskosten in Hüttenwerken als Wegweiser für die technische Rationalisierung.** (German.) Kurt E. Poppe. *Stahl und Eisen*, v. 75, no. 10, May 19, 1955, p. 633-640.

Percentage alterations of the initial Fe quantity through successive processing stages as related to corresponding expenditures and returns, as well as to conversion and materials cost in each stage, subdivided into groups of cost types. Graphs, diagrams.

11519* How to Lower the Operating Costs of the Rolling Mill. **Jak obniżyć koszty własne walcowni.** (Polish.) Karol Jelonek. *Wiadomości Hutnicze*, v. 11, no. 1, Jan. 1955, p. 15-18.

Effect of calorific value of gas and amount of excess air on heating furnace efficiency; economic aspects of billet size and wt. Table, graphs.

See also:

12281 (the future of polyethylenes)

FLUID MECHANICS

11520 Longitudinal Diffusion in Liquid Flow Through an Annulus Between a Stationary Outer Cylinder and a Rotating Inner Cylinder. P. Croockewit, C. C. Honig, and H. Kramers. *Chemical Engineering Science*, v. 4, June 1955, p. 111-118.

Diffusion coefficient determined for various dimensions and rotor speeds. Tables, graphs, diagrams. 7 ref.

11521 Temperature Gradients in Turbulent Gas Streams. Recovery Factors in Steady, Uniform Flow. J. B. Opfell, Kazuhiko Sato, and B. H. Sage. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1243-1248.

Theoretical development for fluids with a high Prandtl number. Table, graphs, diagram. 29 ref.

11522* Various Forms of Equations of Movement of Viscous-Plastic Liquids, and the Law of Hydrodynamic Similarity. **Razlichnye formy uravnenii dvizheniia viazko-plastichnykh zhidkostei i zakon gidrodinamicheskogo podobia.** (Russian.) A. F. Kasimov and A. Kh. Mirzadzhanzade. *Prikladnaia Matematika i Mekhanika*, v. 19, no. 3, May-June 1955, p. 348-352.

Basic differential equations of movement for the determination of the hydraulic resistances in the movement of an argillaceous slip, a cement paste, peat slurry, etc.

11523* Mechanical Elements of Fluids in Porous Media. **Éléments de mécanique des fluides dans les milieux poreux.** (French.) A. Houpeurt. *Revue de l'institut français du pétrole et Annales des combustibles liquides*, v. 10, no. 4, Apr. 1955, p. 247-257.

Application of general principles of mechanics to fluid mechanics in porous media. Diagrams. (To be continued.)

11524* Recent Results and Processes of Rheology. **Neuere Ergebnisse und Verfahren der Rheologie.** (German.) F. Schultz-Grunow. *VDI Zeitschrift*, v. 97, no. 14, May 11, 1955, p. 409-416.

Flow formula based on simple shearing motion for solid-liquid transition range; determination of substance constants and characteristic data; application range of viscosimeters; derivation of dimensionless resistance law of rheological liquid in industrial apparatus. Diagrams, graphs, photographs, table. 25 ref.

Books and Miscellaneous Publications

11525 Reports on Fluid Mechanics. **Mécanique des Fluides.** 443 p. 1954. Publications Scientifiques et Techniques du Ministère de l'Air, Paris. (QC151 M51)

Contains 39 papers in English, French, and German dealing mainly with aeronautical and other applications of fluid mechanics.

See also:

11038 (origin of fluid turbulence)

FOOD TECHNOLOGY

11526* **B-Vitamin Retention in Frozen Meat.** Lendal H. Kotschevar. *American Dietetic Association, Journal*, v. 31, June 1955, p. 589-596.

Retention of thiamine, riboflavin, and niacin under various treatments of freezing, storing, thawing, and cooking of calves' liver and certain muscle meats. Tables. 7 ref.

11527 Growth, Reproduction, Surival and Histopathology of Rats Fed Beef Irradiated With Electrons. C. E. Poling, W. D. Warner, F. R. Humburg, E. F. Reber, W. M. Urbain, and E. E. Rice. *Food Research*, v. 20, May-June 1955, p. 193-214.

Experiments made with rats to determine effect of β irradiation upon wholesomeness of beef as a food. Includes methods of irradiation, observations of relative growth, food efficiencies, reproductive capacities, adult survivals, and histopathological abnormalities of rats fed diets containing irradiated or non-irradiated beef. Tables, graph. 21 ref.

11528 Temperature Tolerance in Frozen Food Processing. Effective Temperatures in Thermally Fluctuating Systems. Sigmund Schwimmer, Lloyd L. Ingraham, and H. M. Hughes. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1149-1151.

Mathematically analyzes effect of fluctuating temperature on frozen food quality. Graphs. 7 ref.

FUELS AND COMBUSTION

11529* On the Coking Behavior of Fat-Coal and Gas-Coal Mixtures. **Über das Verkokungsverhalten von Fett- und Gaskohlen-Mischungen.** (German.) C. Kröger, P. Kaunert, and F. Kuthe. *Brennstoff-Chemie*, v. 36, nos. 9-10, May 11, 1955, p. 142-151.

Coking of coals rich in organic water and volatile constituents. Laboratory and plant experiments; coke structure. Tables, graphs, micrographs. 30 ref.

11530* Present Data for the Use of Liquid Fuels. **Données actuelles pour l'emploi des combustibles liquides.** (French.) S. Crespi. *Chaleur & Industrie*, v. 36, no. 358, May 1955, p. 157-176.

Classification and characteristics of liquid fuels and methods of preparation for combustion. Tables, graphs, diagrams. (To be continued.)

11531* **Why Fuel Research in the Atomic Age?** A. J. Petrick. *Chemical, Metallurgical & Mining Society of South Africa, Journal*, v. 55, Apr. 1955, p. 223-234.

World developments in use of fossil fuels; use of coal as a solid fuel or reagent; conversion of coal into gaseous fuel; production of liquid fuels from coal; production of chemicals. Tables, graph. 24 ref.

11532* Report on a Large-Scale Experiment for Testing the Process of Oil-Gas Generation Developed in Baden-Baden. **Bericht über einen Grossversuch zur Erprobung des in Baden-Baden entwickelten Verfahrens der Ölgaserzeugung.** (German.) Wilhelm Zankl. *Gas- und Wasserfach*, v. 96, Ausgabe Gas, nos. 9-10, May 1955, p. 141-143.

Results on the thermal decomposition of oil absorbed on coke. Tables, graph.

11533* Evaluation of Coking Coal With the Dilatometer. **Die Beurteilung der Kokskohle mit dem Dilatometer.** (German.) Hans Porsch and Otto Dietrich. *Glückauf*, v. 91, nos. 19-20, May 7, 1955, p. 520-523.

Establishing coking factors by dilatometer tests as a means of determining the coking properties of coals. Graph, photograph, tables. 8 ref.

11534 Power and Chemicals From Peat. F. Neville Woodward. *Industrial Chemist and Chemical Manufacturer*, v. 31, May 1955, p. 219-224.

Discusses sources, composition, and recovery; use as a source for power and chemicals. Tables, diagram, photograph. 13 ref.

11535 Organ-Pipe Oscillations in Deep-Ported Burner. Abbott A. Putnam and William R. Dennis. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1184.

Data are presented on acoustic oscillations produced by a burner using a hexagonal bank of hypodermic tubes as deep ports.

11536 Application of Light Scattering to Diesel Fuel Stability Problems. J. Enoch Johnson, Anthony J. Chiantella, and Homer W. Carhart. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1226-1230.

Development of insoluble gums in unstable fuels is shown by 45° scattering. Tables, graphs, diagram. 3 ref.

11537* The Ultimate Structure of Coal. A. Whitaker. *Institute of Fuel, Journal*, v. 28, May 1955, p. 218-223.

An attempt to outline the development of knowledge of coal structure up to the present day and to indicate how new techniques may be expected within the next few years to fill in a reasonably comprehensive picture. Tables. 13 ref.

11538* A Continuous Process for Low-Temperature Gasification of a Solid Fuel With Superheated Steam. **Issledovanie nepreryvnogo protsessa nizkotemperaturnoi gazifikatsii tverdogo topliva pri pomoshchi peregretogo vodiango para.** (Russian.) S. D. Fedoseev and A. B. Chernyshev. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 3, Mar., p. 122-129.

Semicokes and anthracite are used. Tables, graphs, diagram. 5 ref.

11539 The Effect of an Opposing Jet on Flame Stability. Allan Schaffer and Ali Bulent Cambel. *Jet Propulsion*, v. 25, June 1955, p. 284-287.

Performance of this system is described as a possible research tool and brief mention is made of its possible applications to aircraft. Diagram, photographs, graphs. 3 ref.

11540* Effect of Additions on the Properties of Diesel Oils. **Vliianie prisadok na svoistva dizel'nykh masel.** (Russian.) N. G. Puchkov and M. S. Borovaia. *Neftianoe Khoziaistvo*, v. 33, no. 6, June 1955, p. 63-72.

Chemical compositions of various oils; physical-chemical indices characterizing their operational qualities (viscosity, thermal stability, wear-resistance for machines, etc.). Anticorrosion effect, ability to counter scale- and varnish-forming tendency of oils, and antiwear qualities through use of additives. Tables. 4 ref.

11541* Additives for Fuel Oils. **Tilsatsmidler til fyringsolje?** (Norwegian.) Richard H. Westergaard. *Teknisk Ukeblad*, v. 102, no. 22, June 2, 1955, p. 451-456.

Effects of different types of additives on corrosive properties, surface tension, viscosity, stability, heating value of fuel oils, and on the composition of flue gases. 8 ref.

11542* Solid Rocket Fuels. **Treibstoffe für Feststoffraketen.** (German.) Alfred J. Zaehringer. *Weltraumfahrt*, v. 6, no. 2, Apr. 1955, p. 46-51.

Includes diagram, photographs, tables. 7 ref.

Books and Miscellaneous Publications

11543 International Peat Symposium. 819 p. 1954. Dublin. (TN837 In8)

Proceedings of meeting at Dublin, Ireland in July 1954. Papers cover winning, utilization, properties, and combustion.

GEOLOGY AND MINERALOGY

11544 Production of Some Organic Compounds Under Possible Primitive Earth Conditions. Stanley L. Miller. *American Chemical Society, Journal*, v. 77, May 5, 1955, p. 2351-2361.

Study of the effects of spark and silent discharges on a possible atmosphere of CH_4, NH_3, H_2O, and H. Tables, diagrams, chromatograms. 64 ref.

11545 Synthetic Asbestos Investigations. II. X-Ray and Other Data on Synthetic Fluor-Richterite, -Edenite, and -Boron Edenite. J. A. Kohn, and J. E. Comeforor. *American Mineralogist*, v. 40, May-June 1955, p. 410-421.

Includes tables, diagram. 10 ref.

11546 Preliminary Report on Investigations of Minerals of Columbium and Tantalum and of Certain Associated Minerals. Richard W. Hutchinson. *American Mineralogist*, v. 40, May-June 1955, p. 432-452.

Rotation properties of the columbite-tantalite series were investigated and the results and their application to identification are discussed. Tables. 24 ref.

11547* Observation of a New Type of Relief on the Surface of Silicon Carbide Crystals. **Sur l'observation d'un nouveau type de reliefs à la surface de cristaux de carbure de silicium.** (French.) Roger Jouty. *Comptes rendus*, v. 240, no. 17, Apr. 25, 1955, p. 1713-1715.

Micrographic study. Micrographs. 3 ref.

11548* The Raw Materials of Atomic Power. C. F. Davidson. *Discovery*, v. 16, June 1955, p. 234-236.

Aspects of discovery and recovery of U ores. Photographs. 2 ref.

11549* Aluminum and Its Ores. V. A. Eyles. *Discovery*, v. 16, June 1955, p. 251-255.

Popular history of Al production and details of cryolite and bauxite geology. Table, diagrams, photographs.

11550* Some Shapes of Zircon Grains From Transbaikal Granites. **O nekotorykh formakh zeren tsirkonov iz granitov Zabaikal'ia.** (Russian.) I. A. Preobrazhenskii. *Doklady Akademii Nauk SSSR*, v. 102, no. 1, May 1, 1955, p. 145-147.

Describes crystallographic features of this zircon. Diagrams. 12 ref.

11551* Geochemistry of the Vanadium Content of Bauxite. **Adatok a bauxit vanádiumtartalmának földvegytanához.** (Hungarian.) Tilhamér Gedeon. *Kohászati Lapok*, v. 10, no. 5, May 1955, p. 229-231.

Effect of various manufacturing processes on the appearance of V salt. Increasing the V production and its elimination from the alumina production. 9 ref.

GEOPHYSICS

11552* Jet Streams: Fact and Fiction. C. M. Touart. *Air-University Quarterly Review*, v. 7, no. 3, Winter 1954-55, p. 75-88.

Facts about the velocities, width, and direction of air currents above 30,000 ft. Maps. 6 ref.

11553* Turbulence Theory Applied to Large-Scale Atmospheric Phenomena. J. W. Hutchings. *Journal of Meteorology*, v. 12, June 1955, p. 263-271.

Determination of correlation functions for larger-scale fluctuations of pressure and temperature. Tables, graphs. 14 ref.

Geophysics

11554 Results of Limitations on Space Current Densities in Galactic and Intergalactic Space. W. F. G. Swann. *Physical Review*, v. 98, ser. 2, May 15, 1955, p. 871-874.

Includes diagram. 5 ref.

Books and Miscellaneous Publications

11555 New Standard Atmosphere: The WADC 1952 Model Atmosphere. D. T. Williams, J. C. Bell, and W. F. Nash. PB 111585. 54 p. 1954. Office of Technical Services, U. S. Department of Commerce, Washington, D. C.

Development of a self-consistent atmosphere extending up 140,000 ft. Extension of standard-atmosphere tables and the formulation of tables for calibration of flight instruments. Graphs, tables. 34 ref.

GRAPHIC ARTS

11556 Note on "Inverted Relief" in Photographic Illustrations. Neil S. Dempster. *Corrosion*, v. 11, July 1955, p. 312-314.

Points to errors in the orientation of photographs illustrating pitting or blistering forms of corrosion which results in incorrect relief perception by the reader. Suggests photographing specimens illustrating pitting and blistering phenomena so that the shadow falls toward the bottom of the paper. Photographs, micrographs.

11557 Reactors, Radioisotopes, and Rotogravure Research. James M. Dugan. *Gravure*, v. 1, July 1955, p. 11-13.

Structure of the atom, function of a reactor, and an application of tracer chemistry to a problem in gravure research. Other applications of tracer chemistry to gravure problems are mentioned. Diagrams, photograph.

11558* Measurement of Dot Area and Sharpness. D. J. Howe and J. A. C. Yule. *Modern Lithography*, v. 23, June 1955, p. 63 + 6 pages; disc., p. 145-146.

An instrument was constructed which scans many dots and measures the average % dot area at a given density. Photographs, graphs, diagram.

11559* A Photographic Instrument for Flight Path Analysis. Karl J. Fairbanks. *Photographic Engineering*, v. 6, no. 1, 1955, p. 1-10.

Photographic instrument designed to produce a ballistics-type space-time record of a selected portion of an aircraft's flight path. Photographs, diagrams.

11560* A Small Stroboscopic Photo-Instrument. *Photographic Engineering*, v. 6, no. 1, 1955, p. 11-19.

Instrument designed for observing and photographing rapid phenomena of a periodic, and more especially of an aperiodic, nature. Diagrams, photographs.

11561* History of Sound Motion Pictures. Edward W. Kellogg. *Society of Motion Picture and Television Engineers, Journal*, v. 64, June 1955, p. 291-302.

Includes diagrams. 76 ref.

11562* Motion-Picture Photography in Guided-Missile Research. William A. Price and Ernest H. Ehling. *Society of Motion Picture and Television Engineers, Journal*, v. 64, June 1955, p. 310-314.

Use of motion-picture cameras for recording flight of guided missiles is described, including equipment and techniques involved and accuracy limitations of measurements obtained. Photographs, graph, map.

Books and Miscellaneous Publications

11563 The Theory of the Photographic Process. C. E. Kenneth Mees. 2nd. Rev. Ed. 1133 p. 1954. The Macmillan Co., New York. (TR200 M47t2)

A general handbook of photography, guide to the literature, and a summary of its conclusions. Included are sections on photographic materials, action of radiation, optical sensitizing, development and the after processes, and physics of the photographic process.

See also:

12280 (photosensitive plastics)

HEAT POWER

11564 The Control of Turbojet Engines. Donald F. Winters. *Aeronautical Engineering Review*, v. 14, June 1955, p. 62-65, 71.

A discussion of present complexity and methods of simplification. Diagrams.

11565* Some Effects of Mechanical Damping on the Self-Induced Aeroelastic Oscillations of an Axial Compressor Blade. I. M. Davidson. *Aeronautical Quarterly*, v. 6, May 1955, p. 81-98.

Theory; physical significance; principle features of an example; practical effects. Tables, graphs, diagrams. 4 ref.

11566 Catalytic Mufflers Move Gas Trucks Indoors. *American Machinist*, v. 99, June 20, 1955, p. 124-125.

With Pt as a catalyst, CO and hydrocarbons can be burned from exhaust in the muffler. Photograph, diagram.

11567* Stationary Diesel Engine of Many Possible Uses. Stationnaire dieselmotor met veel toepassingsmogelijkheden. (Dutch.) *Bedrijf en Techniek*, v. 10, no. 229, June 4, 1955, p. 273-274.

Description of and data on an English diesel-engine design manufactured with 1 to 6 cylinders. Photographs, tables, graph.

11568* Gas Turbines. E. Bernhardt. *Engineering Journal*, v. 38, June 1955, p. 753-762.

Types of gas turbines on the market; characteristics, economics, design, operations, and predictions as to their future. Diagrams, photographs, tables.

11569* Recovery of Heat Losses in Industry. La récupération des calories dans l'industrie. (French.) H. Perdon. *Flamme et thermique*, v. 8, no. 80, May 1955, p. 13-33.

Equipment and methods. Diagrams, photographs, table.

11570 New Comparator for Measuring Pitch Errors of Root Serrations on Gas Turbine Blades. L. W. Nickols. *Machinery (London)*, v. 86, May 20, 1955, p. 1085-1088.

Measures the pitch of the pressure-flanks of the serrations, but may be easily adapted to measure the pitch of the groove centers Diagrams, photographs.

11571* Whirlpower. Lawrence P. McGrath. *Northwestern Engineer*, v. 14, June 1955, p. 20-21, 52.

Power from the smoothly turning blades of gas turbines may soon be driving out automobiles. Diagram, graph.

11572* Low-Frequency Instabilities in a Rocket Engine. Experimental Study. Les instabilités de basse fréquence dans un moteur-fusée. Étude expérimentale. (French.) M. Barrère and A. Moutet. *Recherche Aéronautique*, 1955, no. 44, Mar.-Apr., p. 29-38.

Determination of importance of various characteristic parameters of the propellant on L.F. instabilities. Oscillographs, diagrams, photographs, graphs, table. 11 ref.

11573* An Entirely New Type of Blast Furnace Gas Engine. Un type entièrement nouveau de moteur a gaz de haut fourneau. (French.) A. Vandeghen, A. Britte, and P. Laval. *Revue universelle des mines*, v. 11, ser. 9, no. 5, May 1955, p. 175-182.

Describes vertical mixed-cycle engine with high speed rotation that can function as a diesel or a gas engine with ignition by injection of liquid fuel. Operation and economical advantages. Photographs, diagrams.

11574* Role of Nitrogen Oxides in Formation of Engine Deposits. R. S. Spindt, Court L. Wolfe, and Donald R. Stevens. *Science*, v. 121, June 10, 1955, p. 836.

Nitrogen is found in substantial amounts. 2 ref.

11575 Dynamic Stress Measurements in Gas Turbines. R. A. Berger and A. W. Brunot. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 45-54. (TG265 So13p)

Use of high-temperature strain gages. Photographs, diagrams, graphs.

11576* Is It Possible to Reduce Materially the Consumption Rates of Modern Jet Engines? **Ist eine entscheidende Senkung der Verbrauchszahlen der heutign Luftstrahltriebwerke noch möglich?** (German.) M. A. Müller. *Zeitschrift für Flugwissenschaften*, v. 3, no. 5, May 1955, p. 113-118.

Considerations given on the suitability of turbo jet engines based on the principle of constant vol. Graphs, diagrams, table.

INFORMATION—PREPARATION AND DISSEMINATION

11577 Chemical Abstracts Millstone or Milestone? Ernest H. Volwiler and Arthur C. Cope. *Chemical and Engineering News*, v. 33, June 20, 1955, p. 2636-2639.

Background for the recent change in CA's subscription rate schedule. Tables, graphs.

11578* The Search for Technical Information. A. G. Kay. *Discovery*, v. 16, June 1955, p. 243, 245, 247.

A do-it-yourself guide to bibliography and library search on a general basis. (To be continued.)

11579 Techniques of Data Searches in Chemical Libraries. Robert E. Maizell. *Journal of Chemical Education*, v. 32, June 1955, p. 309-311.

Data are divided into five echelons based on availability and accuracy.

11580* Introduction to Technical Writing. IV. The Detailed Preparation of the Typescript. E. H. W. Banner. *Laboratory Practice*, v. 4, June 1955, p. 240-243.

Cover headings, references, and figures in reports; articles for publication; and books. (To be continued.)

INSTRUMENTATION AND LABORATORY APPARATUS

11581* A Note on a Simple Universal Fluid Drop Counter. Arthur G. Zupko and Aubert Coran. *American Pharmaceutical Association, Journal, (Scientific Ed.)*, v. 44, June 1955, p. 379-380.

A simple, inexpensive, line operated device for liquids of low electrolyte content. Circuit diagram. 2 ref.

11582* Reliable Measuring Equipment in Heavy Industry. **Grote bedrijfszekerheid in zware industrie door betrouwbare meetapparatuur.** (Dutch.) R. Smit. *Bedrijf en Techniek*, v. 10, no. 227; *Electronica section*, v. 8, no. 174, May 7, 1955, p. 73, 75, 77.

Use of electronic equipment for measuring temperatures, pressure, thickness, etc. in the heavy metals industry. Photographs, diagrams. 11 ref.

11583 Infrared Analyzers in Ammonia Plants. Ian R. Lounsbury. *Canadian Chemical Processing*, v. 39, May 1955, p. 84-86, 88, 90.

Analyzers avoid downtime (by being faster), require less manpower, and are the direct reading instruments for certain plant applications. Tables, diagrams, photographs. 3 ref.

11584 Design and Applications of Conductivity Instruments. H. W. Wilson. *Canadian Chemical Processing*, v. 39, June 1955, p. 68, 70, 72, 74.

Types of installations are discussed. Diagrams.

11585 A Versatile Automatic Fraction Collector With New Features. W. F. Guilbeau and Earl J. Roberts. *Chemist-Analyst*, v. 44, June 1955, p. 53.

Actuation depends on a capacity operated switch in an intermittent siphon. Photograph. 3 ref.

11586 An Automatic Fraction Collector. W. C. Lister. *Chemistry & Industry*, 1955, no. 21, May 21, p. 583-586.

Mechanical and electrical details of a use-proven 100 tube collector. Diagram, photographs, circuit diagram.

11587* Device for Measuring the Velocity of Liquids. **Un appareil pour la mesure de la vitesse des fluides.** (French.) Pierre Dupin. *Comptes rendus*, v. 240, no. 17, Apr. 25, 1955, p. 1687-1689.

New apparatus indicating the velocity of liquid flow on a scaled dial from 1 cm. per sec. to 5 m. per sec. Circuit diagram, photographs, graph.

11588* Measuring and Controlling Filling Levels With Radioactive Substances and Counting Tubes. **Füllstand-Messung und Steuerung mit radioaktiven Präparaten und Zählrohren.** (German.) K. Kruft. *Elektro-Post*, v. 8, no. 12, May 10, 1955, p. 202-204.

Simple, sensitive method of measuring the level of a liquid in a container and the contact planes between solids, liquids, and gases by the combined use of a radioactive substance and a counting tube. Diagrams, photograph.

11589 Calibration of Temperature Measuring Instruments. *Gr. Brit. National Physical Laboratory, Notes on Applied Science*, no. 12, 1955, 47 p. + 2 plates. (T1 G79.5n)

Methods and apparatus used for making routine checks and maintaining working standards. Photographs, graphs, diagrams, tables.

11590 Magnetic Susceptibility Balance. Judson L. Ihrig and Robert G. Caldwell. *Journal of Chemical Education*, v. 32, June 1955, p. 320-323.

Based on an available, slightly modified Kuhlmann microbalance, an old magnetron magnet, and a scissors jack assembled on a wood frame; costs about $25. Diagram, photographs. 4 ref.

11591 A Precaution in the Use of Magnetic Stirrers. Moses Passer. *Journal of Chemical Education*, v. 32, June 1955, p. 332.

Sealed stirring bars may explode at elevated temperatures.

11592 Method of Measuring Film Thickness of Solid Lubricants. H. M. McCullough and I. Sheinhartz. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, July 1955, p. 822-823.

Superficial Rockwell hardness tester can be used as a device for measuring thickness of sprayed graphite and similar coatings at normal and slightly elevated temperatures. Maximum measurable thickness depends on load and diameter of penetrator. Graph.

11593* A Semimicro Dilution Viscometer. Victor E. Hart. *Journal of Polymer Science*, v. 17, June 1955, p. 207-214.

Determines intrinsic viscosity with but one ml. of solution. Diagrams. 4 ref.

11594 A High-Temperature, X-Ray Diffraction, Powder Camera. E. Matuyama. *Journal of Scientific Instruments*, v. 32, June 1955, p. 229-231.

A high-temperature Debye-Scherrer camera fitted with a small C-tube furnace, which is capable of attaining temperatures as high as 1,800 C, is described. Diagrams, graph. 5 ref.

11595 Instrumentation in Electroplating. J. L. M. Fletcher. *Metal Industry*, v. 86, June 24, 1955, p. 533-537.

Discussion of the part that instruments play in different finishing processes, and particularly their role in future developments. Diagram, photographs.

11596 Temperature Measuring Instruments. Henry Barry. *Metal Industry*, v. 86, June 24, 1955, p. 537-539.

Outline of the system used by the Morgan Crucible Co., Ltd. in handling the systematic maintenance, repair, and inspection of their temperature measuring equipment. Photographs.

11597* A New Atomizer for the Flame Photometer. **Ein neuer Zerstäuber für das Flammenphotometer.** (German.) H. Straubel. *Mikrochimica Acta*, 1955, nos. 2-3, p. 329-335.

No compressed air is required in the electrostatically controlled device. Graph, diagrams, photographs. 6 ref.

11598* Electron-Refraction Apparatuses. **Elektronenbeugensapparaturen.** (German.) H. C. Corbet, G. M. van Koppen, J. Kramer, M. van Ments, J. B. Le Poole, and L. L. van Reijen. *Optik*, v. 12, no. 5, 1955, p. 215-225.

Accessories, parts, and design of new electron-refraction apparatuses with electromagnetic lenses. Photographs, diagrams.

Instrumentation and Laboratory Apparatus

11599* Simple Interference Prisms for Determining the Thickness of Thin Films. **Einfache Interferenzprismen für die Dickenbestimmung dünner Schichten.** (German.) G. C. Mönch. *Optik*, v. 12, no. 5, 1955, p. 226-232.

Arrangement of ordinary inverting prisms and prism holders and their uses in measuring thicknesses. Diagrams, photographs. 5 ref.

11600 New Absolute Manometer for Vapor Pressures in the Micron Range. F. M. Ernsberger and H. W. Pitman. *Review of Scientific Instruments*, v. 26, June 1955, p. 584-589.

Construction and use of the manometer is described in detail and an analysis of the possible sources of error is given. Diagrams, table, graph. 16 ref.

11601* Ultraviolet Polymerization of Monomeric Methacrylates for Electron Microscopy. Stanley Weinreb. *Science*, v. 121, May 27, 1955, p. 774-775.

Polymerized by a Westinghouse FS20T12 fluorescent sunlamp (20 watt) in gelatine capsules containing prepolymerized plugs. Photograph. 3 ref.

11602 Methods and Techniques for the Determination of Specific Surface by Gas Adsorption. A. S. Joy. *Vacuum*, v. 3, July 1953, p. 254-278.

Critical review of experimental procedures for the determination of specific surfaces and relative surface areas by measuring the vol. of gas adsorbed on the surface of the solid. Tables, graphs, diagrams. 87 ref.

11603* Microdistillation Apparatus for the Fractionation of Extremely Small Quantities of Radioactive Liquids. **Eine Mikrodestillationsapparatur zum Fraktionieren kleinster radioaktiver Flüssigkeitsmengen.** (German.) Wolfram Block. *Zeitschrift für analytische Chemie*, v. 145, no. 6, 1955, p. 424-426.

Design and operation of device for 0.1 g. samples. Diagrams. 2 ref.

Books and Miscellaneous Publications

11604 Design and Operation of a Carbon-Resistor Furnace. Final Report Under Contract No. AF33(600)-5885. E. C. Sesler, Jr., J. A. Slyh, and W. H. Duckworth. PB 116134. 35 p. 1953. Library of Congress, Publication Board Project, Washington 25, D. C.

The design and operation of a carbon-resistor furnace and the control equipment necessary for its operation are described. Drawings, both of the component parts and assemblies, are included.

See also:

11065 (microscopy of vegetable products)
11252 (an adiabatic microcalorimeter)
11479 (measurement of dielectric constants)

LUBRICATION AND FRICTION

11605* An Interpretation of the Phenomenon of Flocculation in Motor Oils Under the Influence of Heat. **Une interprétation du phénomène de floculation dans les huiles pour moteur sous l'influence de la chaleur.** (French.) Jean Larbre. *Comptes rendus*, v. 240, no. 23, June 6, 1955, p. 2232-2234.

Variations in flocculation temperatures as a function of concentration is used as a basis for explaining above mechanism. Graph. 1 ref.

11606* Recent Advances in the Hydrodynamic Theory of Slider-Bearing Lubrication. F. Osterle and E. Saibel. *Lubrication Engineering*, v. 11, May-June 1955, p. 187-192.

Includes diagrams, graphs. 7 ref.

11607* Plastic Cages for Antifriction Bearings and Emergency-Running Properties of Plastics. **Kunststoff-Wälzlagerkäfige—Notlaufeigenschaften von Kunststoffen.** (German.) A. Gremer. *VDI Zeitschrift*, v. 97, no. 17, June 11 ,1955, p. 509-515.

Comparative tests on the effect of pressure, rate of rotation, and lubricating conditions on the wear resistance of different plastic materials, brass, and steel. Diagrams, tables, graphs. 22 ref.

Books and Miscellaneous Publications

11608 ASTM Viscosity Index Calculated From Kinematic Viscosity. ASTM Special Technical Publication No. 168. 826 p. 1955. American Society for Testing Materials. Philadelphia. (TP691 Am35va)

Results of punched-card machine calculations for lubricants and other petroleum products.

See also:

11592 (film thickness measurement of die lubricants)

MECHANICAL ENGINEERING

11609* The Buckling and Bending of Orthotropic Sandwich Panels With All Edges Simply-Supported. J. R. Robinson. *Aeronautical Quarterly*, v. 6, May 1955, p. 125-148.

A formula is derived for the buckling in compression of an orthotropic sandwich panel, with all edges simply-supported. Diagrams, graphs. 5 ref.

11610* Packaging. J. A. Ambler. *Aluminium Courier*, 1955, no. 30, June, p. 19-21.

Review of the established uses of Al in packaging, with some indication of the latest trends. Photographs.

11611 A Diameter Gage and Dynamometer for True Stress-Strain Tension Tests at Constant True Strain Rate. G. W. Powell, E. R. Marshall, and W. A. Backofen. *American Society for Testing Materials, Preprint No.* 88, 1955, 13 p. (TA401 Am35p)

Design of instruments; typical data from tests on type 301 austenitic stainless steel at several strain rates at temperatures of 20 and −196 C. Diagrams, circuit diagram, photograph, graphs. 10 ref.

11612 The Impact Tube: A New Experimental Technique for Applying Impulse Loads. George Gerard. *American Society for Testing Materials, Preprint No.* 93c, 1955, 16 p. (TA401 Am35p)

Development of an experimental technique for applying loads of an impulsive nature to diaphragms or plates of various shapes. Tables, diagrams, photographs, graphs. 14 ref.

11613* The Present Status of Measuring Stresses With X-Rays. **Zum gegenwärtigen Stande der Spannungsmessung mit Röntgenstrahlen.** (German.) Viktor Hauk. *Archiv für das Eisenhüttenwesen*, v. 26, no. 5, May 1955, p. 275-278.

Factors to be considered in the X-ray method of measuring stresses in metals; advantages of measuring lattice constants and stresses with the counting-tube goniometer. Graphs, tables. 28 ref.

11614* A Functional Morphology of Mechanisms. E. W. Leaver and J. J. Brown. *Automation*, v. 2, July 1955, p. 37-41.

An attempt to discover the least number of concepts which will enable us to describe the various methods of producing work in a highly technological society. Diagrams, tables.

11615* Automatic Controllers. IV. C. W. Worley. *Automation*, v. 2, July 1955, p. 60-72.

The uses and operating characteristics of controllers. A description of two-position, proportional, integral, and derivative controls. Graphs, diagrams.

11616 Variable Speed for Process Control. Richard Le Baron Bowen, Jr. *Chemical Engineering*, v. 62, July 1955, p. 215-222.

Designs for hydraulic, pneumatic, and electric control of mechanical transmissions. Diagrams, photographs.

11617* Electrical Measurement of Mechanical Vibrations. **Elektrische Messung mechanischer Schwingungen.** (German.) W. Grotheer. *Elektro-Post*, v. 8, no. 12, May 10, 1955, p. 193-195.

Principle of vibration meter design and methods of measuring velocity, acceleration, and frequency of vibrations. Diagram.

11618 Automation—What It Means to Foundries. W. R. Jennings. *Foundry*, v. 83, July 1955, p. 115-117.

Some factors that have created the need for automation and what it will bring in the foreseeable future. Photographs.

11619* Lined Steel Shipping Containers for Hard-to-Hold Products. L. J. Nowacki. *Industrial Packaging*, v. 1, June 1955, p. 15-18.

A discussion of the development of single trip lined containers with emphasis on materials of the epoxy-phenolic type. Also mentioned is the possible use of laminated linings in the future. Photographs. 1 ref.

11620 Materials Handling—1855 to 1955. *Iron Age (100th Anniversary Issue)*, v. 175, June 1955, p. 2F-14F.

Developments in equipment; future prospects for improved mechanized systems. Photographs.

11621* Theory of Small Elasto-Plastic Deformations of Anisotropic Media. **Teoriia malykh uprugo-plasticheskikh deformatsii anizotropnykh sred.** (Russian.) I. V. Gol'denblat. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 2, Feb., p. 60-67.

Making use of the general tensor properties of fields of deformation and stresses, the author deduces basic equations for the theory of anisotropic media, relating these to the corresponding equations for the theory of isotropic media. Diagrams. 2 ref.

11622* Automation. *Metalworking Production*, v. 99, June 10, 1955, p. 1013-1076.

Review of developments during the last 9-yr. Machine tools; control systems; inspection procedures; computers.

11623 Evaluation of the Theory on the Post-Buckling Behaviour of Stiffened, Flat, Rectangular Plates Subjected to Shear- and Normal Loads. W. K. G. Floor and T. J. Burgerhout. *Netherlands National Luchtvaartlaboratorium Report* S 370, 1951, p. 9-36. (TL526.N3 N38.5r)

Determination of stresses and strains and the required stiffener cross sections of stiffened plates subjected to compressive- and shear loads. Tables, diagrams, graphs.

11624 Investigation of the Post-Buckling Effective Strain Distribution in Stiffened, Flat, Rectangular Plates Subjected to Shear and Normal Loads. W. K. G. Floor. *Netherlands National Luchtvaartlaboratorium Report* S 427, July 1953, 26 p. (TL526.N3 N38.5r)

Presents diagrams from which the largest effective strain can be determined. Tables, diagrams.

11625 Design Features of AMF's Pinspotter. *Precision Metal Molding*, v. 13, June 1955, p. 35-36.

Includes table, photographs, diagrams.

11626* Transmission Fluids in Aviation. **Fluides de transmission en aéronautique.** (French.) F. Meiller and F. Reynaud. *Recherche Aéronautique*, 1955, no. 44, Mar.-Apr., p. 39-45.

Characteristics of standard fluids and synthetic products for hydraulic transmissions. Tables. 9 ref.

11627* Status of Automation in the Rubber and Plastics Industries. G. V. Kullgren. *Rubber World*, v. 132, June 1955, p. 339-347.

Current status and future outlook. Diagram, photographs.

11628* Correct and Incorrect Design of Weld Constructions. **Richtige und falsche Gestaltung von Schweisskonstruktionen.** (German.) F. W. Griese. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 89-100.

Practical considerations of nature and shape of material, notch effects, type of seam, effect of heterogeneous torsional rigidity and ductility on strength of structural part, elastic and plastic deformations, rigidity with respect to general design. Diagrams, photographs. 10 ref.

11629 Society for Experimental Stress Analysis, Proceedings, (Annual Volume), v. 12, no. 2, 1955, 206 p. Society for Experimental Stress Analysis, Cambridge, Mass. (TG265 So13p)

Individual papers are separately abstracted.

11630 Stress Probing—A Rapid Method for Stress-Surveying. N. Gross and P. H. R. Lane. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 1-8. (TG265 So13p)

Method of determining stresses in structural members or pressure components which can be subjected to cyclic loading. Photographs, graphs, diagrams. 6 ref.

11631 Prediction of Fatigue Failures in Aluminum Alloy Structures. C. R. Smith. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 21-28. (TG265 So13p)

Predictions for a part having a given theoretical stress concentration factor and loading condition. Residual strain calculations. Diagrams, graphs. 7 ref.

11632 Allowable Stresses for Thin Metal Structural Elements at Elevated Temperatures. E. A. Zeitlin. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 29-44. (TG265 So13p)

Typical elastic constants at elevated temperatures are summarized for 18-8 steel, Inconel X, and Ti. Curves displaying the variation of several effective moduli with stress are given. Graphs, tables, photographs. 14 ref.

11633 Study of Some Properties of Stresscoat. A. J. Durelli, S. Okubo, and R. H. Jacobson. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 55-76. (TG265 So13p)

Studies of variables influencing the coating behavior and characteristics used to evaluate the coating. Graphs, table. 1 ref.

11634 Tests of the Conducting Paper Analogy for Determining Isopachic Lines. W. F. Stokey and W. F. Hughes. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 77-82. (TG265 So13p)

Studies of a bar having a centrally located hole, loaded in tension, and for a square plate with compressive loads applied at opposite corners. Photograph, graphs. 4 ref.

11635 The Moiré Method—A New Experimental Method for the Determination of Moments in Small Slab Models. F. K. Ligtenberg. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 83-98. (TG265 So13p)

Determination of the stress distribution in laterally loaded plates. Graphs, diagrams, photographs. 15 ref.

11636 New Progress in Our Knowledge About the Moment Distribution in Flat Slabs by Means of the Moiré Method. C. G. J. Vreedenburgh and H. van Wijngaarden. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 99-114. (TG265 So13p)

Deals with experiments, carried out with small slab models, to find out the maximum slab moments simulating circumstances met in practice, i.e., taking into account the correct shape of column head and drop panel, the presence of marginal beams and other discontinuities in the construction, various load systems, etc. Diagrams, photographs. 6 ref.

11637 Epoxy Adhesives and Casting Resins as Photoelastic Plastics. J. D'Agostino, D. C. Drucker, C. K. Liu, and C. Mylonas. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 123-128. (TG265 So13p)

Results are reported on the elastic and photoelastic properties of epoxy resins: Armstrong C-1, C-2, C-4, C-6, C-9, Cycleweld C-14, Araldite CN501, and CN502. Tables, graphs, photographs. 9 ref.

11638 Experiments on Composite Models With Applications to Cemented Joints. C. Mylonas. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 129-142. (TG265 So13p)

Photoelastic analysis of composite structures. Diagrams, photographs, graphs, table. 20 ref.

11639 Isochromatic Fringe Sharpening and Fringe Multiplication in Photoelasticity. D. Post. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 143-156. (TG265 So13p)

Experimental techniques for obtaining an isochromatic pattern that exhibits several times as many fringes as the conventional pattern. Diagrams, graphs, photographs, table.

11640 Quantitative Three-Dimensional Photoelasticity. M. M. Leven. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 157-172. (TG265 So13p)

Evaluation of degree of accuracy to be expected from use of normal or tangential slices in determining two-dimensional stress distributions on the free surfaces of three-dimensionally stressed

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models into which the stresses have been fixed or "frozen". Photographs, diagrams, tables, graphs. 15 ref.

11641 Creep in Bonded Electric Strain Gages. H. Matlock and S. A. Thompson. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 181-188. (TG265 So13p) Room-temperature creep tests. Creep of considerable magnitude (as much as 16% of the applied strain) was observed. Diagrams, graphs, photograph. 11 ref.

11642 Bending of Rotating Beams. J. B. Tiedemann, T. E. Pardue, and I. Vigness. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 189-200. (TG265 So13p)

Mild-steel cylinders, while rotating about their axes, were bent transversely by forces applied perpendicular to their lengths. Diagrams, graphs, table. 5 ref.

11643 New Apparatus for Study of Deformation of Clamped Circular Plate Loaded With Lateral Pressure. W. H. Hoppmann, II. *Society for Experimental Stress Analysis, Proceedings*, v. 12, no. 2, 1955, p. 201-206. (TG265 So13p)

Bolts normally used to provide edge clamping in plate tests of this type have been made unnecessary by use of a lever device for producing clamping pressures through a uniform centering head. A device is also provided for assuring that the peripheral load on the edge of the circular plate be uniform. Photograph, diagrams, graph. 7 ref.

11644* Automatic Control in the Chemical Industry. **Die automatische Regelung in der chemischen Industrie.** (German.) K. Hengst. *Umschau in Wissenschaft und Technik*, v. 55, no. 10, May 15, 1955, p. 289-292.

Describes water-level, pressure, temperature, flow, and pH controls. Diagrams, photograph, graph.

11645* Recent Development in High-Vacuum Engineering. **Neuere Entwicklungen in der Hochvakuumtechnik.** (German.) Wilhelm Stürmer. *Umschau in Wissenschaft und Technik*, v. 55, no. 10, May 15, 1955, p. 293-296.

Description and illustration of modern vacuum pumps. 2 ref.

11646* Mechanics of Tool Engineering. XXI. Fundamentals of Plant Layout. Andrew E. Rylander. *Western Machinery and Steel World*, v. 46, June 1955, p. 85-90.

Discusses disposition of manufacturing equipment—or logistics—to show how machines and facilities must be properly located to provide the straight-line flow and efficient handling needed for manufacturing economy. Diagrams.

11647* Internal Stresses and the Incompatibility Tensor in the Theory on Elasticity. **Die inneren Spannungen und der Inkompatibilitätstensor in der Elastizitätstheorie.** (German.) Ekkehart Kröner. *Zeitschrift für angewandte Physik*, v. 7, no. 5, May 1955, p. 249-257.

Development of theories of external and internal stresses in analogy to electrostatics and the theory of magnetic fields. Table, diagrams. 27 ref.

See also:

11040 (automatic pilot)
11120 (rheological properties of building materials)

METALLURGY

11648* Marine Applications. L. M. C. Robinson. *Aluminium Courier*, 1955, no. 30, June, p. 16-18.

Summary of the use of Al at sea, the situation as it exists today and some remarks on future progress. Photographs, diagrams.

11649 Beryllium Copper Cuts Forging Die Costs. George H. De Groat. *American Machinist*, v. 99, June 6, 1955, p. 158-159.

Cast Be-Cu dies give excellent surface finish in "as-cast" condition, reduces die costs and permits the use of various materials. Photographs.

11650 Report of Committee A-3 on Cast Iron. *American Society for Testing Materials, Preprint No.* 3, 1955, 13 p. (TA401 Am35p)

Tentative specifications for compositions of various grades of foundry pig iron and methods of testing chilled and white iron castings. Table, diagram.

11651 Report of Committee A-6 on Magnetic Properties. *American Society for Testing Materials, Preprint No.* 5, 1955, 21 p. (TA401 Am35p)

Proposed revised standard methods for testing magnetic materials normal induction and hysteresis of magnetic materials; and specifications for flat-rolled electrical steel. Tables.

11652 Report of Committee B-12 on Non-Ferrous Metals and Alloys. *American Society for Testing Materials, Preprint No.* 9, 1955, 10 p. (TA401 Am35p)

Proposed tentative specifications for Ti sponge and fire-refined casting Cu. Tables. 3 ref.

11653 Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. *American Society for Testing Materials, Preprint No.* 12, 1955, 31 p. (TA401 Am35p)

Proposed tentative specifications for TeCu rod; threadless Cu pipe; Cu and Cu-alloy forging rod, bar, and shapes; and seamless Cu bus pipe and tubes. Tables.

11654 Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. *American Society for Testing Materials, Preprint No.* 14, 1955, 39 p. (TA401 Am35p)

Miscellaneous recommendations affecting standards for light metals and alloys. Tentative specifications for Al bars for electrical purposes (bus bars). Tables.

11655 Report of Committee B-9 on Metal Powders and Metal Powder Products. *American Society for Testing Materials, Preprint No.* 16, 1955, 12 p. (TA401 Am35p)

Tentative specifications for Cu-infiltrated Fe parts and for metal powder sintered bearings (oil impregnated) of bronze- and iron-base mixtures. Tables.

11656 Thermocouple Immersion Errors. J. M. Berry and D. L. Martin. *American Society for Testing Materials, Preprint No.* 95, 1955, 8 p. (TA401 Am35p)

An attempt is made to distinguish between two types of "immersion" errors. First type occurs when an inhomogeneous portion of a thermocouple (developed, perhaps, at the service temperature) is subjected to a temperature gradient and the second is related to conduction of heat to or from the hot junction of the thermocouple. Graphs, diagrams, table. 5 ref.

11657* The Development of Metals in the Aircraft Industry. L. K. Brooks. *Australasian Engineer*, 1955, Apr., p. 51-58.

Processing and applications of Al, Zn, other alloys, and stainless steels. Tables, photographs.

11658* Some Metallurgy and Physics of Germanium. L. W. Davies. *Australasian Engineer*, 1955, Apr., p. 66-71.

Description of the semiconducting electrical properties of Ge, and a description is given of techniques for the production of single-crystal Ge alloys with the properties required for the fabrication of junction transistors. Diagrams, photographs.

11659 Production Control of Quality Steels. R. W. Graham. *Blast Furnace and Steel Plant*, v. 43, June 1955, p. 619-626.

Consideration of the present day steelmaking problem from the viewpoint of an operator who is responsible not only for quality, but also for plant economics. Photographs, graphs.

11660 Metals. P. Feltham and M. W. Thring. Paper from BUILDING MATERIALS—THEIR ELASTICITY AND INELASTICITY. p. 125-188, 1954. Interscience Publishers, New York. (TA407 R27b)

A general discussion of metals in building, heat treatment of steel, engineering and compression tests, shear and tensile stresses, elasticity, creep, fracture, brittle fracture, and fatigue. Photographs, graphs, diagrams, tables. 93 ref.

11661 Improved Aluminum-Tin Bearing Alloys. E. A. Lancaster. *Canadian Metals*, v. 18, May 1955, pt. 2, p. 44-46.

Developments of high-Sn and Al-Sn for bearing alloys which meet demands of heavy load and high temperature operation. Photographs, table. 4 ref.

11662 Development and Application of Tool Steels. I. B. M. Hamilton. *Canadian Metals*, v. 18, July 1955, p. 39-41.

A review of the early development and applications; the advantages and disadvantages of their use today. Graph, micrographs. (To be continued.)

11663 Nionel Reference Sheet. I. W. Z. Friend. *Chemical Engineering Progress*, v. 51, May 1955, p. 66.

Description, composition, chemical and mechanical properties of this new alloy. (To be continued.)

11664* Some Chemical Engineering Problems of the Iron and Steel Industry. A. H. Leckie. *Chemical and Process Engineering*, v. 36, June 1955, p. 211-214.

What the chemical engineer can contribute to improvement of present processes on adoption of new ones, viz. the Linz-Dusenverfahren process and continuous casting. Table, graphs, photographs. 13 ref.

11665 The History and Development of Aluminium and Its Alloys. A. von Zeerleder. *Engineers' Digest*, v. 16, May 1955, p. 217-220.

Discusses the processes of reducing Al, its applications, and the analysis of its alloys.

11666 British Standards for Aluminium. E. Elliott. *Engineers' Digest*, v. 16, May 1955, p. 221-226.

Describes standards for Al and its alloys for general engineering purposes, and also for the specialized field of aircraft construction. Tables. 1 ref.

11667 Aluminium-Alloy Bearings. E. A. G. Liddiard. *Engineers' Digest*, v. 16, May 1955, p. 248-252.

Development of Al-alloy bearings and reasons for wider applications in the future. Micrographs, graphs, table. 6 ref.

11668* Directions for the Substitution of Steel and Heavy Non-Ferrous Alloy Castings by Aluminum Castings. **Hinweise zur Umstellung von Eisen- und Nichteisen-Schwermetallguss auf Aluminiumguss.** (German.) Hermann Kessler. *Giesserei*, v. 42, no. 12, June 9, 1955, p. 307-309.

Advantages of Al castings. Chemical, physical, and mechanical properties of cast Al alloys as a main factor in selecting fields of substitution. Tables. 4 ref.

11669 Applications of Small Industrial Ovens. Herman Gehnrich. *Industrial Heating*, v. 22, May 1955, p. 1019 + 7 pages.

Applications and discussion of batch type ovens. Photographs.

11670 Unwieldy Metal Sheets Handled Neatly by Automatic Machines. *Iron Age*, v. 175, June 16, 1955, p. 96-97.

Use of feeders, turnover machines, pilers, and other equipment for handling large sheets. Photographs.

11671 Iron and Steel—1855 to 1955. *Iron Age (100th Anniversay Issue)*, v. 175, June 1955, p. 2D-21D.

Past, present, and future developments in furnaces, alloys, galvanizing, rolling, and raw materials. Photographs.

11672 Nonferrous Metals—1855 to 1955. *Iron Age (100th Anniversary Issue)*, v. 175, June 1955, p. 2H-17H.

Developments in properties, processing, and applications. Photographs.

11673 The Design and Construction of Lackenby Steelworks. I. Layout, General Design, and Construction. II. Furnaces, Mixers, and Fuel-Supply Systems. A. P. Clark and S. Cornforth. *Iron and Steel Institute, Journal*, v. 180, June 1955, p. 180-188 + 4 plates.

Discussion of the plant designed for an output of 625,000 tons of ingots per annum, from five 360-ton open-hearth tilting furnaces, and two 600-ton active mixers, working 50 to 80% hot metal and producing mainly structural steels. Diagrams, photographs.

11674* Investigation of the Physical-Chemical Properties of Slag Melts. **Issledovanie fiziko-khimicheskikh svoistv shlakovykh rasplavov.** (Russian.) L. A. Shvartsman and A. M. Samarin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 4, Apr., p. 73-97.

Surface tension, viscosity, density, and electrochemical studies of various slag systems. Cryoscopic measurements. Tables. 41 ref.

11675 Electrical Contacts in Precious and Special Metals. *Machinery Lloyd (Overseas Ed.)*, v. 27, June 4, 1955, p. 79-83.

Some applications in industry as solders, photographic materials, fuse wire, and electrical contacts are discussed. Tables, photographs.

11676 Permanent Magnet Steels and Alloys. F. Knight. Paper from MAGNETIC ALLOYS AND FERRITES. p. 95-147. 1954. George Newnes, London. (QC761 Sa98m)

Advances made in permanent magnet techniques; diffusion and precipitation hardening alloys; physical and mechanical properties; permanent magnet design; testing and demagnetizing; applications; micropowder magnets. Photographs, graphs, tables, diagrams. 16 ref.

11677 French Aluminium Industry. Maurice Moyal. *Metal Industry*, v. 86, June 17, 1955, p. 509-511.

Raw materials; extraction; fabrication; new projects. Photographs.

11678 Non-Ferrous Progress Since World War I. Maurice Cook. *Metallurgia*, v. 51, no. 307, May 1955, p. 227-230.

Paper on the progress made in melting and casting, rolling, tube production, extrusion, furnace design, joining, and the advent of new materials and their uses.

11679* High Strength Cast Irons Without Special Elements. **Les fontes résistantes exemptes d'éléments spéciaux.** (French.) J. Pascal. *Métallurgie et la construction mécaniques*, v. 87, no. 5, May 1955, p. 369, 371, 373, 375.

Properties and production of high strength pearlitic cast iron. Graphs. (To be continued.)

11680* Compressed Air in Aircraft Production. W. E. Wright. *Metalworking Production*, v. 99, Apr. 22, 1955, p. 705-713.

Use of compressed air for production and testing. Photographs, diagrams.

11681* Postwar Applications of Aluminum in Britain. E. G. West. *Modern Metals*, v. 11, June 1955, p. 38 + 5 pages.

Applications in prefabricated houses and schools, roofing and siding, ships and boats, road transport vehicles, railway cars, farm implements, electrical equipment, and containers. Photographs, diagram.

11682 Titanium: A New Growth Industry. *Monthly Business Review*, 1955, June, p. 3-6, 10.

Uses and advantages; Ti ores; manufacture of Ti sponge; melting and rolling. Map, graph, table.

11683 Finish Compressor Blades to 6-8 Micro-Inches. *Precision Metal Molding*, v. 13, June 1955, p. 59-62.

Processes in producing a sintered compressor blade; including pressing, heat treating, grinding, cleaning, polishing, and plating. Photographs.

11684* Engine Bearings of Aluminum. D. B. Wood. *Railway Locomotives and Cars*, v. 129, July 1955, p. 47, 49.

Lists the basic advantages of solid Al bearings and some points of consideration in design. Photographs.

11685* The Platinum Group Metals. **Les métaux de la famille du platine.** (French.) Edmund Merriman Wise, *Revue de métallurgie*, v. 52, no. 4, Apr. 1955, p. 265-286.

Industrial and jewelry uses; alloy compositions; properties. Tables, diagrams, graphs, photographs. 61 ref.

11686* Correct and Incorrect Application of the Most Important Processes of Oxy-Acetylene Techniques. **Richtige und falsche Durchführung der wichtigsten Verfahren der Autogen-Technik.** (German.) K. W. Sippell, K. Boeckhaus, H. Kunz, W. Lenk, and R. Pfeiffer. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 70-79.

Proper and improper methods of gas welding, flame cutting, low-temperature stress relieving, flame straightening, and flame cleaning. Photographs, table, diagrams, graph.

11687* Structure, Mechanical Behavior, and Standardization of Gray Iron in the Light of a Divariant System. **Die Struktur, das mechanische Verhalten und die Normung des Graugusses im Lichte eines divarianten Systems.** (German.) A. Collaud. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 21, no. 5, May 1955, p. 151-161.

Metallurgy

Effects of heat treatment and correlations between the different mechanical properties; possible metallurgical measures of improving the properties of gray iron, and proposition on the standardization of its quality. Tables, graphs.

11688 Aluminium Roofing and Cladding. H. W. Johnson. *Sheet Metal Industries,* v. 32, no. 338, June 1955, p. 425-432.

Progress in the field of roofing and cladding of structures. Use in making tiles, wall facings, and spandrels. Photographs, diagrams, tables.

11689* The Use of Killed Basic Converter Steel for Oil Field Pipes. **Di Verwendung von beruhigtem Thomasstahl für Ölfeldrohre.** (German.) Ewald Baerlecken and Werner Scheurer. *Stahl und Eisen,* v. 75, no. 11, June 2, 1955, p. 718-721.

Notched bar impact bending test on DVM specimens in the non-aged and aged condition for temperatures between −140 and +20 C; in addition, tensile and welding tests on oilfield pipes made of basic converter steel killed by Al (DTP steel) and of killed open-hearth steel. Possibilities of using killed basic converter steel instead of open-hearth steel for oil-field pipes. Tables, graphs.

11690* Seventy-Five Years of Sulzer High-Pressure Pipe Lines. *Sulzer Technical Review,* 1954, no. 4, 48 p.

Developments in materials, manufacture, joining, and use of large pipelines and penstocks. Photographs, diagrams, graphs.

11691* Metallurgical View Points on the Production of Copper Tubing. **Metallurgiske synspunkter ved fremstilling av kopperrør.** (Norwegian.) Olav Jore. *Tidsskrift for Kjemi, Bergvesen og Metallurgi,* v. 15, no. 4, 1955, p. 60-70.

Consideration of H, O, and S contents in the melting and casting of Cu; methods and equipment for extruding and rolling Cu tubing; effect of cold-drawing on structure. Diagrams, graphs, photographs, micrographs. 14 ref.

11692 Materials Handbook. VIII. Properties of Molybdenum. Harry Majors, Jr., R. H. Wallace, G. E. Wendell, and R. T. Webster. *U. S. Atomic Energy Commission, CRD-*A19-27, 1953, 26 p. (UF767 Un3.1cr)

Mechanical, physical, and fabrication properties. Tables, graph. 17 ref.

11693 The Use of Indium in High-Vacuum Equipment. F. L. Reynolds. *U. S. Atomic Energy Commission UCRL-*2989, May 1955, 4 p. (UF767 U3u)

The use of In and In-coated Cu as gasket materials. A simple yet novel valve employing In that does not use organic materials as vacuum seal. Diagrams.

11694 The Present Position of Aluminium in Shipbuilding. E. G. West. *Welding and Metal Fabrication,* v. 23, June 1955, p. 194-203.

Alloys for marine use; design factors; economic considerations; working and fabricating methods; properties. Photographs, diagram, table. (To be continued.)

11695 A Review of Aluminium Alloy as Engineering Materials. J. R. Handforth. *Welding and Metal Fabrication,* v. 23, June 1955, p. 204-210.

Alloy compositions and properties; forming methods; applications. Tables, photographs, graphs. 3 ref.

11696 Molybdenum. A High-Temperature Structural Metal. William M. Fraser and Robert T. Freeman. *Westinghouse Engineer,* v. 15, July 1955, p. 130-133.

Properties; working; machining; joining; applications; future prospects. Photographs, diagrams.

11697* Utilization of Electrodes in Electric Furnaces. **Użytkowanie elektrod w piecach elektrycznych.** (Polish.) Eugeniusz Horoszko. *Wiadomości Hurnicze,* v. 11, no. 4, Apr. 1955, p. 98-102.

Physical and chemical properties of electrodes; transportation, storage, installation, and their behavior in furnaces. Table, diagrams.

11698 Fabrication of Resistance Alloys. William L. Stryker. *Wire and Wire Products,* v. 30, June 1955, p. 668-671, 726.

Discussion of the production of alloys used in the electrical appliance industry. Photographs.

11699* Synthetic Cryolite in the Aluminum Industry. **Synthetische Kryolithe in der Aluminiumindustrie.** (German.) Günther Wendt. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 8, no. 5, May 1955, p. 207-214.

Uses of cryolite in the ceramics, pesticides, and Al industry; losses of cryolite in Al electrolysis; demand and supply of natural Na_3AlF_6; synthesis of Na_3AlF_6, its behavior in electrolysis, quality testing, and recovery from smelting wastes. Tables, graphs. 27 ref.

Books and Miscellaneous Publications

11700 Metallurgy of the Rarer Metals. Pt. III. Manganese. A. H. Sully. 305 p. 1955. Academic Press, New York. (TN798 M56)

History; occurrence; production; alloys; properties; applications.

11701 ASTM Standards on Copper and Copper Alloys, 586 p. 1954. American Society for Testing Materials, Philadelphia. (TA480.C7 Am35s)

The various standards and tentative methods of test and specifications pertaining to Cu and Cu-base alloy products presented in convenient reference form.

11702* 1955 SAE Handbook. 1094 p. Society of Automotive Engineers, New York. (TL151 S1)

Standards and recommended practices on steels and iron; nonferrous metals; non-metallic materials; threads; bolts, nuts, and screws; splines and serrations; bearings; springs; tubing and fittings; electrical equipment; lighting equipment; engines and parts; car, truck, bus equipment; tractors and earthmovers; and marine equipment.

11703* Correlation List of American and European Composition of Stainless Steel. PB111549. 10 p. 1954. U. S. Department of Commerce, Office of Technical Services, Washington, D. C. (TA479.S7 Un3.7c)

Listing of principle brand names as they compare with standard compositions of the American Iron and Steel Institute. Tables.

See also:

11354 (galvanizing specifications)
12148 (specifications for alloy steel products)

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11704* Production of Aluminothermic Ferro-Chromium and Ferro-Tungsten. **Produção de ferro-cromo e de ferro tungstênio aluminotérmicos.** (Portuguese.) Dalcy Horta Machado. *ABM (Boletim da associação brasileira de metais),* v. 10, no. 37, Oct. 1954, p. 385-389.

Brazilian patent for new variation of thermite process. Results compared with those by electric furnace process.

11705 Titanium Casting Metallurgy and Production Techniques. D. I. Sinizer and C. M. Adams, Jr. *American Foundryman,* v. 27, June 1955, p. 85-89.

Control measures to be used when handling liquid Ti, refining and remelting, and skull melting. Discussion of gating methods, solidification time, casting furnace, and furnace specifications. Graphs, tables, photographs, diagram.

11706* Model Experiments on the Reversal of Flow in the Head of Open-Hearth Cold-Gas Furnaces. **Modellversuche über die Umlenkung der Strömung im Kopf von Siemens-Martin-Kaltgasöfen.** (German.) Michael Hansen. *Archiv für das Eisenhüttenwesen,* v. 26, no. 5, May 1955, p. 243-251.

Experiments on the optimum design of the head of above furnace for returning the rising air to the melt. Diagrams, graphs, tables. 3 ref.

11707* Determination of the Optimum Conditions for the Reduction of Metallic Oxides by Carbon. **Wyznaczanie optymalnych warunków dla redukcji tlenków metali węglem.** (Polish.) Emilian Iwanciw. *Archiwum Górnictwa i Hutnictwa,* v. 3, no. 1, 1955, p. 131-153.

Mechanism of the process; experimental data include temperature and pressure relations to reduction. Graphs, tables. 9 ref.

11708 Zone-Melting. William G. Pfann and Karl M. Olson. *Bell Laboratories Record*, v. 33, June 1955, p. 201-205.

Details of process being used extensively in the commercial production of ultra-pure Ge. Method is now being applied on a laboratory scale to a host of other materials. Photographs, diagrams, graph.

11709 Coke Quality and Blast Furnace Operating Practice. W. T. Rogers. *Blast Furnace and Steel Plant*, v. 43, June 1955, p. 627-634.

By the use of simultaneous analysis of blast furnace operating variables and coke quality characteristics the independent effect of coke quality on blast furnace performance can be evaluated in an uncomplicated manner. Tables, graphs. 1 ref.

11710 Pneumatic Steelmaking Processes. I. D. J. Carney. *Blast Furnace and Steel Plant*, v. 43, June 1955, p. 635-640.

Some of the processes are discussed along with the advantages and disadvantages, properties and uses, chemistry, thermal requirements, deoxidation reactions, and N control. Graphs, tables. (To be continued.)

11711 The Utilization of Blast Furnace Slag Requires Close Cooperation Between Slag Processor and Furnace Operator. E. W. Bauman. *Blast Furnace and Steel Plant*, v. 43, June 1955, p. 650-653.

Some of the problems encountered when using slag in prestressed concrete. Development of foamed slag for use as an aggregate in lightweight concrete. 3 ref.

11712 The Oxygen Low-Shaft Furnace and Its Operation. H. Erne. *Henry Brutcher Translation No.* 3420, 16 p. (From *Stahl und Eisen*, v. 74, no. 25, 1954, p. 1644-1648.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 4155, v. 4, Mar. 1955.

11713 On Some Problems of High-Vacuum Metallurgy. W. Scheibe. *Henry Brutcher Translation No.* 3488, 6 p. (Abridged from *Metall*, v. 7, nos. 19-20, 1953, p. 751-754.) Henry Brutcher, Altadena, Calif.

Importance of vapor pressure; vapor pressure as function of temperature; fractional, separation of impurities from metals by distillation. Examples of vacuum furnace installation. Photographs, graph, diagrams.

11714 Deoxidation of Steel With Silicon and Manganese. I. S. Kulikov and A. M. Samarin. *Henry Brutcher Translation No.* 3501, 12 p. (Abridged from *Izvestiya Akademii Nauk SSSR, OTN*, 1954, no. 10, Oct., p. 23-30.) Henry Brutcher, Altadena, Calif.

Thermodynamic study of the deoxidation of steel based on the theory of real solutions for the oxide systems. Calculation of composition of products of deoxidation with Si and Mn at different concentrations of these elements in the bath. Tables, graphs. 6 ref.

11715 Effect of Moisture in Ores Upon the Reduction of Iron Oxides. V. T. Bragin. *Henry Brutcher, Translation No.* 3509, 12 p. (Abridged from *Izvestiya Akademii Nauk SSSR, OTN*, 1954, no. 10, Oct., p. 31-38.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 8122, v. 4, June 1955.

11716* Consumption of Water at Iron and Steel Plants. **Consommation d'eau aux usines sidérurgiques.** (French.) Marcel Steffes and Pierre Mosel. *Centre Belge d'Etude et de Documentation des Eaux, Bulletin (trimestrielle)*, 1955, no. 28, p. 91-98.

Study of supply, control, and use of cooling, washery, and feed waters. Diagrams, graphs, tables.

11717* Mechanism of the Dephosphorizing Process of Liquid Iron by Slag. **O mekhanizme protsessa obesfosforivaniia zhidkogo zheleza shlakom.** (Russian.) O. A. Esin and V. N. Shikhov. *Doklady Akademii Nauk SSSR*, v. 102, no. 2, May 11, 1955, p. 327-330.

Influence of the original content of P; determination of the reaction order for the passage of P from the metal into the slag and the reverse process; temperature and time factors; investigation by tracer elements. Graphs, diagram. 6 ref.

11718* Kinetics of the Distribution of Sulfur Between Liquid Iron and Slag. **Kinetika raspredeleniia sery mezhdu zhidkim zhelezom i shlakom.** (Russian.) O. A. Esin and V. N. Shikhov. *Doklady Akademii Nauk SSSR*, v. 102, no. 3, May 21, 1955, p. 583-586.

Related rate of desulfurization of molten Fe by basic and acid slags to concentration of S in the slags. Graphs, table. 6 ref.

11719 Recent Innovations in the Control and Operation of Zirconium Reduction Furnaces. F. E. Block and A. D. Abraham. *Electrochemical Society, Journal*, v. 102, June 1955, p. 311-315.

Recent trends in automatic furnace control and instrumentation are reported. Diagrams, table. 8 ref.

11720 Preparation of Titanium by Fluoride Electrolysis. M. A. Steinberg, S. S. Carlton, M. E. Sibert, and E. Wainer. *Electrochemical Society, Journal*, v. 102, June 1955, p. 332-340.

Preparation of commercially pure metal powder by electrolysis of K_2TiF_6 in molten NaCl. Operating conditions of the electrolysis and their effect upon the metal so produced. Photographs, graphs, micrographs, tables, diagrams. 12 ref.

11721* Efficiency of Induction Furnaces for the Melting of Pig Iron and Steel, Copper Alloys, and Aluminum and Its Alloys. **Rendimento nei forni ad induzione per la fusione di ghisa e acciaio, leghe di rame, alluminio e loro leghe.** (Italian.) G. Aldo Tagliaferri. *Fonderia*, v. 4, no. 4, Apr. 1955, p. 155-161.

Compares various types of induction furnaces; effects of low and high frequencies and crucible-type; energy equations. Photographs, diagrams, tables.

11722 Blast-Furnace Design and Refractory Wear. *Foundry Trade Journal*, v. 98, May 19, 1955, p. 545-547.

German experience with C-block linings which points a no. of parallel applications to foundry furnaces.

11723* Chief Parameters of Open-HearthFurnaces. **Základní parametry Martinových peci.** (Czech.) Vladimír Balabanov. *Hutnické Listy*, v. 10, no. 5, May 1955, p. 266-278.

A detailed and critical literature survey and some conclusions based on the author's own experience, relating to the fuel effects on furnace performance, specific heat consumption, gas velocity, and the preheating and hearth areas. Tables, graphs, diagrams. 21 ref.

11724 Air Flow in Beds of Granular Solids. J. B. Wagstaff and E. A. Nirmaier. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1129-1135.

Five earlier works are compared in the first step of studying gas flow and its reactions in a blast furnace. Tables, graphs. 14 ref.

11725 Melting Furnaces for Non-Ferrous Metals. III. W. A. Darrah. *Industrial Heating*, v. 22, May 1955, p. 966, 968, 970, 972.

Refractories, burners and furnace melting, and installation problems are described.

11726 Hydrogen in Steelmaking. III. H. Epstein, J. H. Walsh, and T. B. King. *Industrial Heating*, v. 22, May 1955, p. 990, 992.

Rate of H elimination from the bath by a flushing calculation. Graph. 6 ref.

11727 Direct Reading Spectrometer Speeds Magnesium Production. C. A. Sauer. *Iron Age*, v. 175, June 16, 1955, p. 87-89.

Through the development of direct reading instruments for spectrochemical analysis, tighter control of alloy content in a fraction of the time previously required is possible. Diagrams, graph, photograph, table.

11728 Install Vacuum Setup for Dual Melting Role. W. G. Patton. *Iron Age*, v. 175, June 23, 1955, p. 95-97.

Description of a semi-continuous 1000 lb. vacuum induction melting furnace. Close control of O and N content and ability to make alloy additions under vacuum conditions will aid the development of new high-temperature alloys. Diagram, photographs.

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11729 Continuous Casting at Atlas Steels, Ltd. John F. Black and F. W. Rys. *Iron and Steel Engineer*, v. 32, June 1955, p. 78-87; disc., p. 87.

Principles; requirements; equipment operating procedures. Photographs, diagrams, tables.

11730 Extending Blast Furnace Stack Life After Appearance of Hot Spots. R. W. Sundquist. *Iron and Steel Engineer*, v. 32, June 1955, p. 88-94; disc., p. 94-95.

Detection procedures; installation of shell sprays; placing grout; installation of cooling plates. Tables, photographs, diagrams.

11731 Developments in Design of Modern Open Hearths. Jay J. Seaver. *Iron and Steel Engineer*, v. 32, June 1955, p. 96-99; disc., p. 99-100.

Provisions for sealing of furnaces to stop infiltration, positive draft, clean gas, improved checker brick, and improved gas flow. Diagrams, photograph.

11732 Large Electric Furnaces. D. F. Campbell. *Iron and Steel Institute, Journal*, v. 180, June 1955, p. 107-113 + 2 plates.

Past, present, and future status of the large arc furnace as a producer of C and low-alloy steel in large quantities. Table, photographs, diagram. 1 ref.

11733 The Operation of a 60-Ton Arc Furnace. R. Wilcock. *Iron and Steel Institute, Journal*, v. 180, June 1955, p. 113-116 + 1 plate.

Description of operating experience during the first few months of production covering melting, slag reduction and oxidation, temperature controls, electrode consumption, refractory performance, and quality of steel produced. Photographs, tables.

11734 Observations of Stainless Steel Melting Practice. D. C. Hilty, H. P. Rassbach, and Walter Crafts. *Iron and Steel Institute, Journal*, v. 180, June 1955, p. 116-128.

Melting practice for stainless steels is reviewed and rationalized with theoretical considerations to provide the bases for prediction and control of the process and the design of the most economical practices. Graphs, tables. 23 ref.

11735 Rate of Desulphurization of Carbon-Saturated Iron by Blast-Furnace Slags. C. E. A. Shanahan. *Iron and Steel Institute, Journal*, v. 180, June 1955, p. 140-144.

Laboratory experiments show that large degrees of agitation do not produce equivalent increases in the rate of desulphurization of liquid Fe by blast-furnace slag. Graph. 8 ref.

11736* Investigation of the Limiting Stages of the Process of Desulfurizing Liquid Iron by Means of Slag. **Issledovanie limitiruiushchikh etapov protsessa obesserivaniia zhidkogo zheleza shlakom.** (Russian.) O. A. Esin and V. N. Shikhov. *Izvestiia Akademii Nauk SSSR, Otdelenie Teknicheskikh Nauk*, 1955, no. 2, Feb., p. 105-112.

Effect of original concentration of S in the metal on the rate of its passage into various slags. Tables, graphs. 12 ref.

11737* Some Problems of a Slag Theory. **Nekotorye voprosy teorii shlaka.** (Russian.) I. S. Kulikov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 2, Feb., p. 113-121.

Activity of iron oxide in the system FeO-SiO_2 at temperatures from 1178 to 3000 C. Concentration dependence of partial heats and entropies of solution. Graphs, table. 9 ref.

11738* Investigation of the Kinetics of the Dephosphorization of Liquid Fe by Slag. **Issledovanie kinetiki obesfosforivaniia zhidkogo zheleza shlakom.** (Russian.) O. A. Esin and V. N. Shikhov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 3, Mar., p. 79-89.

Compares distribution indices of P and its radioactive isotope; chemical analysis and radiation measurement; effect of phase surface separation and height of slag layer; rate of direct and reverse reactions; effect of original P concentration in metal, and slag composition. Graphs, tables. 12 ref.

11739* Activity of O in Liquid Fe. **Aktivnost' kisloroda v zhidkom zheleze.** (Russian.) V. V. Averin, A. Iu. Poliakov, and A. M. Samarin. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 3, Mar., p. 90-107.

Experimental equipment for preparing gas mixtures; quartz H.F. melting furnace. Relation of coefficient of activity of O to gas temperature and composition. Tables, graphs, diagrams, photographs, micrograph. 15 ref.

11740* Study of the Static Pressure Change With Respect to the Blast Furnace, Height and Measurement of Temperature in the Hearth. **Izuchenie izmeneniia staticheskogo davleniia po vysote domennoi pechi i izmerenie temperatury v gorne.** (Russian.) N. N. Chernov, I. F. Domnitskii, and G. S. Manchenko. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 4, Apr., p. 63-72.

New method of regulating furnace pressures. Reliable temperature measurement at tuyères, etc., provide basis for automatic control of heating. Graphs, diagrams. 5 ref.

11741 Gary Blast Furnace Operates Successfully on 100 Pct Sinter Burden. R. W. Sundquist. *Journal of Metals*, v. 7, June 1955, p. 737-741.

Results of approximately nine months of operation on No. 12 furnace at U. S. Steel Corp. Gary Works. Tables, graphs, diagrams. 10 ref.

11742 Oxygen Flash Smelting Swings Into Commercial Operation. *Journal of Metals*, v. 7, June 1955, p. 742-750.

Copper flotation concentrate and flux are injected horizontally with O into a specially designed reverberatory furnace, and smelting temperature is maintained solely by the flash combustion of Fe and S while the particles are in suspension. Photographs, diagrams, tables, graphs. 17 ref.

11743 Thirty-One-Year-Old Furnace Bottom Yields Copper Bonanza. Harold Foard. *Journal of Metals*, v. 7, July 1955, p. 793-795.

History of the furnace, removal of slag bottom, analysis of slag, and installation of the new bottom are discussed. Tables, diagrams.

11744 Processing of Zinc Oxide Fume at Flin Flon, Manitoba. Roy Ellerman. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, July 1955, p. 813-822.

Includes roasting for F elimination and counter-current leaching to produce a neutral sulphate solution. This solution is combined with Zn S leach solution for subsequent purification and electrolysis. Photograph, diagrams, graphs, tables, flowsheets. 2 ref.

11745* Decreasing the Burning Losses of Deoxidizing Materials, and Endogenous Slag in Steel During Open-Hearth Steel Production. **A dezoxidáló anyagok (Mn, Si, Al) leégésének és az acél endogén eredetű salakosságának csökkentése a Martin-acélgyártásnál. I.** (Hungarian.) Dezső Csépai. *Kohászati Lapok*, v. 10, no. 5, May 1955, p. 211-214.

Investigation of the physical chemistry of the oxidation of Mn in the open-hearth furnace. Experiments for optimum transition of the Mn of the charge into the steel. Graphs, tables. (To be continued.)

11746* Decreasing the Burning Losses of Deoxidizing Materials (Mn, Si, Al) and the Quantity of Endogenous Slag of Steel in Open-Hearth Steel Production. **A dezoxidáló anyagok (Mn, Si, Al) leégésének és az acél endogén eredetű salakosságának csökkentése a Martin-acélgyártásnál. II.** (Hungarian.) Dezső Csépai *Kohászati Lapok*, v. 10, no. 6, June 1955, p. 257-262.

Industrial experiments for decreasing endogenous slag inclusions in steel. Detailed production data on low S and P steel production. Photograph, micrograph, tables.

11747 Preparation of Pure Titanium. *Light Metals*, v. 18, June 1955, p. 175-176.

Application of a process known as "catalytic distillation" to the extraction and purification of Ti and Al.

11748 Materials Engineering File Facts. How Some Elements Affect Steel. *Materials & Methods*, v. 41, June 1955, p. 139.

Relative effects of various elements on steel properties are indicated in table form. Table.

11749 Vapour Phase Production of Titanium. C. J. V. Denning. *Metal Industry*, v. 86, May 13, 1955, p. 395-398.

Describes experimental work which has been carried out on an invention which may be the basis of a continuous reduction process. Tables, diagram, photographs. 2 ref.

11750 New Developments in Titanium Extraction. J. P. Levy. *Metal Industry*, v. 86, May 20, 1955, p. 415-418.

Discusses the features of vapor phase reduction of titanium tetrachloride by Mg that makes it a possible successor to the established liquid phase process. Photograph, diagrams. 4 ref.

11751 Progress in the Extraction of Aluminium. L. V. Chilton. *Metal Industry*, v. 86, June 3, 1955, p. 457-459.

Reduction processes, furnace design and operation, purity of product, power supply, and plant locations are discussed. Photographs, diagrams. 11 ref.

11752* The Metallurgical Evaluation of Iron Ores and Other Raw Materials. **Die metallurgische Bewertung von Eisenerzen und anderen Rohstoffen.** (German.) A. N. Pochwisnew. *Metallurgie*, v. 5, no. 3, Mar. 1955, p. 82-85.

Mathematical determination of coke consumption and heat equivalence based on the chemical composition of different iron ores.

11753* What Reactions Cause the Foaming of Slag in the Basic Open-Hearth Process? **Welche Reaktionen bedingen das Schäumen der Schlacke beim basischen Siemens-Martin-Verfahren?** (German.) Kurt Fellcht. *Metallurgie*, v. 5, no. 3, Mar. 1955, p. 85-98.

Theoretical analysis and experimental study of above problem. Graphs, diagrams, tables, photographs, micrographs.

11754* Extraction Metallurgy. Graham Oldham. *Mining Journal (Annual Review)*, May, p. 127, 129, 131, 133.

Developments in non-ferrous reduction processes and refining techniques. Photographs. 26 ref.

11755* Investigations on the Reducing Conditions in the Blast Furnace. **Untersuchungen über die Reduktionsverhältnisse im Hochofen.** (German.) Jakob Willems, Willy Oelsen, and Hans Genz. *Stahl und Eisen*, v. 75, no. 10, May 19, 1955, p. 618-624.

Comparison of the reducing conditions when smelting two burdens in the same furnace and the smelting of one burden in two different furnaces. Graphs, diagrams. 11 ref.

11756* Reduction Experiments on Iron Ores. **Reduktionsversuche an Eisenerzen.** (German.) Herman Schenck. *Stahl und Eisen*, v. 75, no. 11, June 2, 1955, p. 682-690.

Measurement and effects of the permeability to gas and of the voids in the ore. Effect of particle size, speed and composition of gases, stability of ores, and gangue on reducibility. Photographs, graphs, micrographs. 14 ref.

11757* Results of an Experimental Operation of a Blast Furnace With Ferro-Coke. **Ergebnisse eines Betriebsversuches mit Eisenkoks.** (German.) Helmut Linde, Kurt Schwindt, and Max Paschke. *Stahl und Eisen*, v. 75, no. 11, June 2, 1955, p. 691-693.

Details of the blast furnace and experimental conditions. Data on the composition of the pig iron, increase of Si content by use of ferro-coke, and coke consumption. Tables, graphs. 2 ref.

11758* Description and First Operation Data of the New Open-Hearth Steel Plant No. II at Huckingen. **Beschreibung und erste Betriebskennzahlen des Siemens-Martin-Stahlwerkes II in Huckingen.** (German.) Karl Georg Speith and Helmut Kobusch. *Stahl und Eisen*, v. 75, no. 11, June 2, 1955, p. 694-699.

The plant: its erection, starting, and first operation data, and charging and melting capacity. Photographs, diagrams, graphs.

11759 New Life for Metals. *Steel*, v. 137, July 4, 1955, p. 82-83.

Use of vacuum melting in producing purer metals. Improving mechanical properties of old alloys and production of new ones. Photographs, diagrams.

11760* Tasks and Problems of Pig-Iron Production in Switzerland. **Aufgaben und Probleme der Roheisenerzeugung in der Schweiz.** (German.) Hans Georg Erne. *von Roll Mitteilungen*, v. 13, nos. 1-2, Jan.-June 1954, p. 1-12.

Properties of electric pig iron are discussed. Graphs, map, diagram, table, micrographs. 15 ref.

11761* The Low-Shaft Oxygen Furnace. **Der Sauerstoff-Niederschachtofen.** (German.) Hans Georg Erne. *von Roll Mitteilungen*, v. 13, nos. 1-2, Jan.-June 1954, p. 13-23.

Pig iron can be melted from ore or steel scrap and gray cast iron from steel or cast iron scrap. Diagrams, tables, graphs. 7 ref.

11762* Economic Utilization of Ferromanganese in the Deoxidation of Steel. **Oszczędzajmy żelazomangan przy odtlenianiu stali.** (Polish.) Leonid Andrejew. *Wiadomości Hutnicze*, v. 11, no. 2, Feb. 1955, p. 45-47.

Steel-making methods; comparisons of metal properties and burn-off losses of Mn when additions are made in the ladle and furnace. Tables.

11763* Refining of Metallurgical Lead. **Rafinowanie ołowiu hutniczego.** (Polish.) Kazimierz Doniec. *Wiadomości Hutnicze*, v. 11, no. 2, Feb. 1955, p. 51-56.

Chemical compositions of leads prepared in foundries at home and abroad. Removal of Cu; detinning; dezincing; elimination of As and Sb. Tables, diagrams.

11764* Fire Refining of Copper. **Rafinacja ogniowa miedzi.** (Polish.) Kazimierz Kurski. *Wiadomości Hutnicze*, v. 11, no. 3, Mar. 1955, p. 72-78.

Types of Cu ores appropriate for fire refining and impurities contained; behavior of impurities during refining. Graphs. 5 ref.

11765* Use of Radioactive Isotopes in Investigating Non-Metallic Inclusions in Steel for Roller Bearings. **Zastosowanie promieniotwórczych izotopów do badań pochodzenia wtrąceń niemetalicznych w stali na łożyska toczne.** (Polish.) Leonid Andrejew. *Wiadomości Hutnicze*, v. 11, no. 3, Mar. 1955, p. 82-84.

Slag impurities in steel melted in H.F. induction furnaces. Contamination by particles from the basic lining of the crucible of the induction furnace, by slag particles of the bearing steel melted in a ½-ton arc furnace, and by impurities from the pouring set-up. Tables.

11766* Eliminating the Noble Metals. **Usuwanie metali szlachetnych.** (Polish.) Kazimierz Doniec. *Wiadomości Hutnicze*, v. 11, no. 3, Mar. 1955, p. 84-88.

Methods of refining Pb to eliminate small amounts of Ag, Au, and Zn by electrolytic refining, liquation, and distillation. Resulting chemical compositions of refined leads. Table, diagrams, graphs.

See also:

11116 (preparation of casting ladles)
12383 (electric arc in smelting)

METALS—FINISHING, POLISHING, AND CLEANING

11767 Stainless Flatware Proves That Beauty Results From Mechanized Polishing. Rupert Le Grand. *American Machinist*, v. 99, July 4, 1955, p. 106-109.

Selection of materials, segregation of facilities, and steps used to minimize the polishing operations required to make a finished product. Photographs.

11768* Problem of the Choice of the Optimum Smoothness of Finish of Friction Surfaces. **K voprosu o vybore optimal'noi chistoty obrabotki trushchikhsia poverkhnostei.** (Russian.) M. A. Ryzhik. *Avtomobil'naia promyshlennost'*, 1955, no. 5, May, p. 20-22.

Polishing and grinding prescriptions established in connection with dimensions and rotations of parts; wear tests. Photographs. 4 ref.

11769 Barrel Finishing. H. B. Underhill. *Canadian Metals*, v. 18, June 1955, p. 54, 56-57.

Advantages include savings due to reduction in direct labor costs and revealing of flaws by the cleaning and conditioning action of the process. Photographs.

Metals—Finishing, Polishing, and Cleaning

11770* Developments in Preparatory Treatments. II. Chemical. *Corrosion Prevention and Control*, v. 2, June 1955, p. 37-39.

General methods and tests, oxide film effect, pickling studies, ultrasonic cleaning, and specific treatment for Al and Al alloys. (To be continued.)

11771* Mechanism of Silver Electropolishing. **O mekhanizme elektropolirovki serebra.** (Russian.) A. T. Vagramian and A. P. Popkov. *Doklady Akademii Nauk SSSR*, v. 102, no. 2, May 11, 1955, p. 297-300.

Investigation by means of polarization curves; relation of anode polarization change to current density. Polarization curves, diagram.

11772 Surface Finishing Aluminum Castings. John H. Keating. *Finish*, v. 12, July 1955, p. 33-36.

Polishing and buffing operations and equipment. Diagrams.

11773 Blast Equipment Maintenance Can Save You Money. L. M. Johns. *Foundry*, v. 83, July 1955, p. 128-129.

Discussion of batch-type and continuous-type blast barrel cleaning used in foundry cleaning rooms. Photograph.

11774* Stainless Steel Finishing. *Industry & Welding*, v. 28, June 1955, p. 78-82, 152.

Grinding and polishing procedures. Abrasive selection; lubrication; wheel speed. Photographs.

11775 Corrosion Resistant Alloys Play Key Part in Pickling. *Iron Age*, v. 176, July 7, 1955, p. 94-96.

Use of corrosion resistant alloys in pumps, valves, and other equipment assures continued high speed operation with minimum maintenance. Table, photographs.

11776 More Production Through Chemical Maintenance. A. David Nesbitt. *Iron and Steel Engineer*, v. 32, June 1955, p. 104-112; disc., p. 112-115.

Chemical cleaning of piping, open-hearth checkers, and checkerwork in blast furnace stoves. Photographs, tables, graph, diagram. 15 ref.

11777 Barrel Finishing. *Metal Industry*, v. 86, May 20, 1955, p. 419-421.

Describes tumbling equipment, media, operation, and loading. Photographs.

11778* Present Status of Mechanical Surface Treatment. **Der heutige Stand der mechanischen Oberflächen-behandlung.** (German.) H. H. Finkelnburg. *Metall*, v. 9, nos. 11-12, June 1955, p. 466-471.

Review of cutting and non-cutting methods of changing or improving the surfaces of metals. Micrographs, table, diagrams, photographs. 4 ref.

11779* Innovations in the Practice of Grinding and Polishing. **Neuerungen aus der Schleif- und Polierpraxis.** (German.) W. Burkart. *Metall*, v. 9, nos. 11-12, June 1955, p. 472-473.

Brief account of new polishing methods and materials. Micrographs.

11780* Modern Surface Treatment in Automobile Manufacturing. **Moderne Oberflächenbehandlung im Kraftfahrzeugbau.** (German.) M. Eitel. *Metall*, v. 9, nos. 11-12, June 1955, p. 474-478.

Reviews the various methods of shaping, cleaning, and coating automotive parts by mechanical, chemical, and thermal means. 7 ref.

11781* Degreasing Metal Parts With Solvent Vapor. **Über das Entfetten von Metallteilen mit Lösemitteldampf.** (German.) A. Arnold. *Metall*, v. 9, nos. 11-12, June 1955, p. 483-486.

Description and evaluation of different methods of removing films of oil and fat with vaporized solvents.

11782* Polishing Agents for Metal Surfaces. Silicone Polishes. **Poliermittle für Metalloberflächen. Silikon-Polituren.** (German.) Fritz Ohl. *Metalloberfläche*, Ausgabe A, v. 9, no. 6, June 1955, p. 93-95.

Effect and advantages of silicone-containing polishing agents. Table.

11783 Cleanability and Oil Spreading Rates. Henry B. Linford and Paul E. Grubb. *Plating*, v. 42, July 1955, p. 895-902.

Development of a correlation between the spreading rate of various oils, fats, and greases (which are solid at room temperature) on a particular metal with the cleanability or difficulty of cleaning that soil from another metal. Tables, graphs, diagrams. 3 ref.

11784* Use of Basalt Jets for Pneumatic Drum Fettling Machines. **Použití čedičových trysek v bubnových tryskačích.** (Czech.) Otakar Mičaník. *Slévárenství*, v. 3, no. 5, May 1955, p. 133-135.

Jets stand twenty times more than cast iron jets during uninterruped operation; output of machines has increased because formerly it was necessary to exchange cast iron jets every three hours. Diagrams, table. 3 ref.

11785 Pickling at Half the Cost. George S. Shephard. *Steel*, v. 137, July 4, 1955, p. 76, 79.

Pickling line installed at Pittsburgh Screw and Bolt Corporation cut pickling costs in half, increased production, and upgraded production quality. Photographs.

See also:

11444 (metal cleaning)

METALS—FOUNDRY PRACTICE

11786* "Wet Sands" Used in "Casting Sands". **"Argilas úmidas" aplicadas nas "areias de fundição".** (Portuguese.) Carlos Dias Brosch. *ABM (Boletim da associação brasileira de metais)*, v. 10, no. 37, Oct. 1954, p. 363-380.

Preparation and properties of molding-sand mixtures having high moisture contents. Graphs, tables.

11787 Five Ways to Desulphurize. D. E. Parsons and S. L. Gertsman. *American Foundryman*, v. 27, June 1955, p. 60-65.

Results of an investigation on the reduction of the S content of gray iron by means of ladle treatment. Tables, graphs, micrographs. 6 ref.

11788 Quick Test for Melt Quality—Measures Gas Content. H. Rosenthal and S. Lipson. *American Foundryman*, v. 27, June 1955, p. 69-73.

Development of a gas content tester which has a means for conveniently solidifying an Al sample under controlled reduced pressure. Gas content of the sample is qualitatively determined by examining the appearance of the surface of the sample. Photographs, diagram, graphs. 9 ref.

11789 How to Measure Molding Sand Blowability. Donald M. Murray. *American Foundryman*, v. 27, June 1955, p. 78-81.

Investigation of methods for evaluating the blowability of a sand-clay mixture. Photographs, graphs, tables.

11790 Start Duplex Malleable Control With Raw Materials. Lawrence E. Emergy. *American Foundryman*, v. 27, June 1955, p. 90-95.

Some control tips when using malleable pig iron in the duplex melt charge. Micrographs, graphs, tables.

11791* Mechanized Shell Molding for Efficient Foundry Production. *Automation*, v. 2, July 1955, p. 73-76.

A process where a mixture of sand, wetting agent, and thermosetting phenolic resin is brought into contact with a heated pattern to produce a thin, tough, and gas porous shell mold. Diagram, photographs.

11792 The Waterglass-Carbon Dioxide Molding Process for Gray-Iron Foundries. O. Gerstmann and E. Grohmann. *Henry Brutcher Translation No.* 3514, 7 p. (Abridged from *Giessereitechnik*, v. 1, no. 2, 1955, p. 16-17.) Henry Brutcher, Altadena, Calif.

A compact description of how the process should be employed in a gray cast iron foundry. Diagrams, photograph, table.

11793 The Feeding Requirements of Nodular Iron Castings. R. C. Shnay. *Canadian Metals*, v. 18, June 1955, p. 37-38.

Principles of risering, solidification characteristics, feeding distance, and minimum riser dimensions are discussed. Tables, photograph. 3 ref.

11794* Foundry Practice. IX. The Molten Metal. William H. Salmon and Eric N. Simons. *Edgar Allen News*, v. 34, June 1955, p. 132-133.

Advantages and disadvantages of cupola melting and some factors in the making of cast steel. Table, diagram. (To be continued.)

11795 Die Casting in Aluminium. Frank G. Wollard. *Engineers' Digest*, v. 16, May 1955, p. 239-243.

Advantages of die casting over sand casting are discussed. Photographs.

11796* Lost-Wax Casting Process. **Il procedimento di fusione a cera persa.** (Italian.) W. H. Sulzer. *Fonderia*, v. 4, no. 4, Apr. 1955, p. 137-144.

Survey of latest improvements in method; materials, other than wax, for the patterns and casting porcedure; metals and alloys for casting, mechanical properties, purposes for which used, and weldability. Photographs, tables, diagrams.

11797* Binding Agents for Self-Drying Cores. **Les liants de noyautage autosiccatifs.** (French.) Pierre Nicolas. *Fonderie*, 1955, no. 111, Apr., p. 4474-4482.

Factors influencing hardening of the self-drying sand and difficulties in using this sand. Graphs.

11798 Spinning Cylinder Sleeves at Perfect Circle. Kenneth L. Mountain. *Foundry*, v. 83, July 1955, p. 108-114.

Development of a method for centrifugally casting cylinder sleeves. Discusses cooling problem, cupola charge, automatic spraying of coating, and flexibility in size of castings. Photographs, micrograph.

11799 Better Castings With Less Metal. A. J. Stone, H. B. Kinnear, and A. R. Fraser. *Foundry*, v. 83, July 1955, p. 118-121.

Use of rapidly igniting exothermic compounds on open risers of castings and on hot tops of ingots to eliminate excessive piping and shrink cavities caused by premature freezing of the feeding metal. Discusses delaying of skin formation on top surface of the riser, feeding a bronze casting, and their application to Al.

11800 Centrifugal Casting With a German, Water-Cooled Machine. P. J. Ahern and J. F. Wallace. *Foundry*, v. 83, July 1955, p. 130-135.

Design and operation of a German centrifugal casting machine used for large-scale gun tube manufacture and a comparison with its counterpart in the U.S.A. Photographs, micrographs, diagrams. 6 ref.

11801 Foundry Problems and Principles. G. J. Rogers. *Foundry Trade Journal*, v. 98, May 19, 1955, p. 531-539.

Examples of experiences in foundry work illustrating broad principles and precepts. Photographs, diagrams.

11802 Cores and Moulds by the CO_2 Process. A. Talbot. *Foundry Trade Journal*, v. 98, May 26, 1955, p. 559-568.

Comparison of producing castings by conventional practices of dry- and green-sand molding and oil-sand coremaking and by the CO_2 process. Examples are quoted and comparative costs are given. Photographs.

11803 Place of Shell Moulding in the Foundry. B. H. C. Waters. *Foundry Trade Journal*, v. 98, June 2, 1955, p. 587-596.

The place of shell molding in the foundry and some of the possible competitive processes of shell molding are assessed. Techniques of the process are considered. Photographs, diagrams, graphs, micrograph, tables. 8 ref.

11804 Aspects of Steel Foundry Practice. H. Hart. *Foundry Trade Journal*, v. 98, June 9, 1955, p. 615-620.

Improvements in riser and grating techniques result in fewer rejects and stronger castings. Photographs, diagrams, graph. 2 ref. (To be continued.)

11805 Aspects of Steel Foundry Practice. H. Hart. *Foundry Trade Journal*, v. 98, June 16, 1955, p. 645-653.

Atmospheric cores, partial mold, reversal during casting, dry sand molding, scabbing of molds and cores, porosity, and fireclay runner sleeves. Diagrams, photographs, graph, table. 8 ref.

11806* Elastic Chill Mold for Casting Tensile-Test Bars. **Elastische Kokille zum Giessen von Zerreissprobestäben.** (German.) K. Wittmoser. *Giesserei*, v. 42, no. 9, Apr. 28, 1955, p. 234-235.

Design of mold which does not exert tensile stress on the test bar. Diagrams, photograph, graph, table.

11807* The Use of Carbon-Dioxide Solidification Process in the Production of Cores on the Core Blower. **Die Anwendung des Kohlensäure-Erstarrungsverfahrens bei der Kernherstellung auf den Kernschiessmaschine.** (German.) Winand Jansen. *Giesserei*, v. 42, no. 9, Apr. 28, 1955, p. 236-237.

Sand-binder mixtures; elimination of casting cracks by proper composition of core sands; economy of the CO_2 solidification process.

11808* The Behavior of Molding Sand During the Process of Molding and Casting of Gray Iron, and the Testing of Molding-Sand Properties. **Das Verhalten des Formsandes während des Form- und Giessvorganges bei Grauguss und die Prüfung der Formsandeigenschaften.** (German.) Wilhelm Wegener. *Giesserei*, v. 42, no. 10, May 12, 1955, p. 245-254.

Suggestions for a method of determining plasticity of sand, and research results on the effect of coal-dust additions on the formation of scabs and casting skins. Diagrams, graphs, photographs, micrographs. 21 ref. (To be continued.)

11809* The Hot-Blast Cupola Furnace in the Steel Mill. **Der Heisswind-Kupolofen im Stahlwerk.** (German.) A. Dahlmann. *Giesserei*, v. 42, no. 10, May 12, 1955, p. 258-259.

Advantages and proper operation of above type of furnace; effect of melting conditions on C content. Graphs. 4 ref.

11810* Effect of the Metallurgical Properties of the Steel-Mold Casting on the Tendency to Hot Cracking. **Der Einfluss der metallurgischen Eigenschaften des Stahlformgusses auf die Warmrissneigung.** (German.) Hans Heyer and Eugen Piwowarsky. *Giesserei*, v. 42, no. 11, May 26, 1955, p. 273-279.

Device for testing the effects of casting temperature, grain size, and C, P, and S contents on susceptibility to hot cracking; discussion of test results. Micrographs, graphs, diagrams, photographs, tables.

11811* The Behavior of Molding Sand During the Molding and Casting Process of Gray Iron for the Testing of Molding-Sand Properties. **Das Verhalten des Formsandes während des Form- und Giessvorganges bei Grauguss und die Prüfung der Formsandeigenschaften.** (German.) Wilhelm Wegener. *Giesserei*, v. 42, no. 11, May 26, 1955, p. 280-285.

Effect of water and coal-dust content on the gas permeability of sand molds; suggestions for the continuous control of sand molds, especially with respect to proper grain size and type of coal dust. Graphs, tables, micrographs.

11812* Temperatures of the Acid Refractory Linings of Small Converters. **Temperaturen der feuerfesten Ausmauerung von saueren Kleinkonvertern.** (German.) W. Bading. *Giesserei*, v. 42, no. 11, May 26, 1955, p. 288-290.

Rate of temperature rise and changes; and average temperatures at different points of the converter lining. Diagrams, graphs, table. 9 ref.

11813* Working With the Hot-Blast Cupola Furnace. **Das Arbeiten mit dem Heisswind-Kupolofen.** (German.) Willi Haas. *Giesserei*, v. 42, no. 11, May 26, 1955, p. 291-292.

Principles of operating, charging, and servicing. Tables.

11814* Progress in the Construction of Recuperators for Hot-Blast Cupola Furnaces. **Fortschritte im Bau von Rekuperatoren für Heisswind-Kupolöfen.** (German.) Alfred Schack. *Giesserei*, v. 42, no. 12, June 9, 1955, p. 302-307.

Descriptive review of different types of modern recuperators. Diagrams, photographs. 5 ref.

Metals—Foundry Practice

11815* Preventing Gas Absorption From the Mold When Casting Cu Alloys. **Förhindrande av gasupptagning från formen vid gjutning av kopparlegeringar.** (Swedish.) Tore Malmberg. *Gjuteriet*, v. 45, no. 4, Apr. 1955, p. 45-50.

Suppressing reaction by using a mold material which will cause rapid solidification of the melt or by spraying a protective metal coating on the mold wall. Diagram, tables. 9 ref.

11816* Water Absorption in Dried Cores. **Fuktupptagning hos bakade kärnor.** (Swedish.) Rolf Morén and Stig Bergman. *Gjuteriet*, v. 45, no. 4, Apr. 1955, p. 51-54.

Development of a laboratory method to study water absorption under controlled conditions. Photographs, graphs, tables, diagrams.

11817* Automatic Molding Machines. **Automatiska formmaskiner.** (Swedish.) J. Broberg, L. B. Lindh, and K. Åkesson. *Gjuteriet*, v. 45, no. 5, May 1955, p. 61-65.

General views on automatic molding, considering patterns, molding materials, transport of flasks and mold parts, and maintenance of the machines. Descriptions of some Swedish automatic molding machines. Photographs, diagrams.

11818 Blown Shell Cores, Molds Produced at High Rates. W. G. Patton. *Iron Age*, v. 175, June 16, 1955, p. 92-95.

Machine blows molds and cores at the rate of 240 pieces per hr. Combines electrically heated split patterns or molds, sand resin blowing equipment, and a heated mandrel. Photographs.

11819 Casting—1855 to 1955. *Iron Age (100th Anniversary Issue)*, v. 175, June 1955, p. 2B-14B.

Developments and prospects in materials and methods of melting, molding, and mechanical handling. Photographs.

11820 Sand-Resin Cores, Molds Produced Automatically on Versatile Core Blower. W. G. Patton. *Iron Age*, v. 176, July 7, 1955, p. 91-93.

Gas-fired unit yields blown and cured cores of exceptional accuracy. Shell molds can be produced for stack molding and are accurate enough to permit the use of mechanical backup during pouring. Photographs.

11821* Influence of Liquid-Steel Temperature on Ingot Structure. **Vliianie temperatury zhidkoi stali na stroenie slitka.** (Russian.) A. P. Pronov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 4, Apr., p. 58-62 + 1 plate.

Macrostructure and crystallization pattern of a basic open-hearth steel ingot. Optimum dimensions of ingot and adequate thermal insulation of deadhead part, as well as proper degree of overheating above melting point. Photograph, diagram. 7 ref.

11822 Large Titanium Castings Produced Successfully. R. A. Beall, F. W. Wood, and A. H. Roberson. *Journal of Metals*, v. 7, July 1955, p. 801-804.

Conditions for casting the metal, size of castings, materials, equipment, and deep pool studies are discussed. Photographs, diagrams, graph. 7 ref.

11823* Production of Ferromolybdenum Directly From MoS_2. **Ferromolibdén-gyártás közvetlenül MoS_2-ből.** (Hungarian.) László Visnyovszky. *Kohászati Lapok*, v. 10, no. 6, June 1955, p. 272-275.

Various production methods and their economic comparison for yield. Tables, graphs. 6 ref.

11824 Light Metals Die Casting Outlook and Review. J. C. Fox. *Light Metal Age*, v. 13, June 1955, p. 16-18, 28, 35. Materials, equipment, and methods for die casting Al and Mg.

11825 Aluminium Casting Alloys in Great Britain. F. H. Smith. *Light Metals*, v. 18, June 1955, p. 179-181.

Review of the growth of Al and Al alloy casting methods and casting quality in the past 50 yr. Graphs, tables. 7 ref.

11826 Quality Stainless Castings by Contour Chill Method. Roland E. Groethe. *Materials & Methods*, v. 41, June 1955, p. 110-111.

Application to television tube dies resulted in reduced cost and savings in material. Photographs, table.

11827 Pressure Die-Casting—A Re-Cap. *Metal Industry*, v. 86, May 27, 1955, p. 439-441.

Favorable characteristics; fundamentals of process; qualities of castings; types of machines used. Photographs, diagrams. (To be continued.)

11828 The Centenary and the Foundry. A. P. Fenn. *Metal Industry*, v. 86, June 3, 1955, p. 460-463.

Presents a brief picture of the progress of the Al foundry industry and attempts to highlight the important stages in the development of the art of production of Al castings. Photographs.

11829 Direct Chill Casting of Light Metal Billets. Herbert Capitaine. *Metal Industry*, v. 87, July 1, 1955, p. 9-11.

A consideration of the processes of pretreatment of the melt which affect the quality of the cast billets and discussion of means whereby sound billets and rolling slabs can be produced. Diagrams, tables. 4 ref.

11830* Manufacturing Problems of Large Steel Castings. **Nagyméretű acélöntvények gyártási problémái.** (Hungarian.) Zoltán Nagy. *Öntöde*, v. 6, no. 5, May 1955, p. 107-112.

Problems of shrinkage, the formation of stresses, and molding materials. Photographs, diagrams. (To be continued.)

11831* The Role of Ammonium Bifluoride in Mg Casting. **Ammoniumbifluorid szerepe a magnézium öntészetben.** (Hungarian.) Gyula Emőd and Pál Németh. *Öntöde*, v. 6, no. 6, June 1955, p. 127-131.

Experiments and results on substituting ammonium bifluoride for boric acid and S during the sand casting of Mg and its alloys. Table, photographs. 6 ref.

11832 Castability: Its Effect on Alloy Selection. I-II. Walter A. Dubovick. *Precision Metal Molding*, v. 13, June 1955, p. 44-45, 48-50; July 1955, p. 40-43, 69-71.

Factors and conditions affecting castability; grading of materials; comparison of investment casting with wrought materials.

11833* Electromagnetic Stirring. Application to Desulfurization. **Brassage électromagnétique. Application à la désulfuration.** (French.) J. Duflot and M. Porcheray. *Revue de métallurgie*, v. 52, no. 4, Apr. 1955, p. 335-347.

Advantages of this method of stirring include more rapid chemical homogenization and an acceleration of desulfurization. Tables, graphs. 3 ref.

11834* Clay as a Binder in Synthetic Molding Mixtures. **Glina kot vezivo v sintetičnih livarskih mešanicah.** (Slovenian.) Ciril Pelhan. *Rudarsko-metalurški zbornik*, 1954, nos. 3-4, p. 259-273.

Use of semisynthetic and synthetic sands, and various binders; mineralogical composition and physical properties of clays. Tables, diagrams. 6 ref.

11835* Foundry Properties of Spheroidal Cast Iron. **Slévárenské vlastnosti tvárné litiny.** (Czech.) Václav Oliverius. *Slévárenství*, v. 3, no. 5, May 1955, p. 130-133.

Properties, especially fluidity, and linear and vol. contraction are dealt with, in addition to molding techniques of spheroidal cast iron. Tables, graphs, photographs. 4 ref.

11836* Fast Measurement of Mold Face and Core Moisture Content After Drying. **Rychlé měření vlhkosti líce forem a jader po sušení.** (Czech.) Miroslav Houšť. *Slévárenství*, v. 3, no. 5, May 1955, p. 135-138.

Determined by measurement of their electric conductivity, using a simple inexpensive apparatus. Photographs, diagrams, tables, graphs. 4 ref.

11837* Casting of Complicated Tools. **Výroba složitých nástrojů přesným litím.** (Czech.) Otakar Morávek. *Slévárenství*, v. 3, no. 5, May 1955, p. 138-141.

Possibilities of using lost wax precision casting for the production of complicated tools are described. Most favorable conditions for the production of molds for wax patterns as well as wax mixtures are indicated. Photographs. 4 ref.

11838* Corner Connection of Core Boxes. **Rohové spojení jaderníkových skříní.** (Czech.) Vít Toman and Josef Grgurič. *Slévárenství*, v. 3 ,no. 5, May 1955, p. 141-142.

To reduce wood consumption, Czechoslovakian foundries use two ways of corner connections; hinge connections, with screw drawing, and eccentric locking. Diagrams, photographs. 4 ref.

Books and Miscellaneous Publications

11839 Foundry Manual for Sand Casting Aluminum-10 Per Cent Magnesium Alloy. P. D. Frost. PB 111577. 122 p. 1954. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

Contains sections on melting, gating and risering, hot and cold cracking, and properties of sand.

See also:

11705 (titanium casting)

METALS—HEAT TREATMENT

11840* **The Heat Treatment of Carburising Steels.** F. P. Heard. *Australasian Engineer*, 1955, Apr., p. 44-50.

Selection of carburizing steels and heat treatment for machinability. Gas and pack carburizing procedures. Tables, diagram, graphs, micrographs. 8 ref.

11841 Commercial Annealing and Quenching Plus Tempering of Cold-Drawn Steel Bars With Special Consideration of Scaling, Decarburization, Heating Rate, and Temper Brittleness. II. Quenching Plus Tempering of Cold-Drawn Steel. W. Hülsbruch. *Henry Brutcher Translation No.* 2965, 18 p. (From *Stahl und Eisen*, v. 70, no. 15, 1950, p. 647-653.) Henry Brutcher, Altadena, Calif.

Advantages and disadvantages of the different quenching plus tempering practices. Best tempering temperature before and after drawing. Changes in physical properties upon polishing (by cross rolling). Graphs, diagrams, photographs. 13 ref.

11842 Rapid Gas Carburizing by Induction Heat. A. D. Assonov, K. Z. Shepelyakovskii, and P. A. Lankin. *Henry Brutcher Translation No.* 3468, 10 p. (Condensed from *Vestnik Mashinostroeniya*, v. 34, no. 6, 1954, p. 56-60.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 14528, v. 3, Oct. 1954.

11843 Low-Frequency Heating of Aluminum Billets. H. Rohn. *Henry Brutcher Translation No.* 3478, 10 p. (From *Aluminium*, v. 30, no. 7, 1954, p. 298-300.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 14510, v. 3, Oct. 1954.

11844 Cold Treatment of Chrome-Tungsten-Manganese Tool Steel. L. I. Gardina. *Henry Brutcher Translation No.* 3505, 6 p. (From *Vestnik Mashinostroeniya*, v. 33, no. 11, 1953, p. 54-55.) Henry Brutcher, Altadena, Calif.

Study of effect of cold treating of a tool steel upon its mechanical properties and cutting performance, based on hardness tests, micrographic analysis, determination of magnetic properties, slow bend, and torsion impact tests. Tables, graph.

11845* **Magnetic Recording Measures Cooling.** Rodney P. Elliott. *Frontier*, v. 18, Summer 1955, p. 17-19.

During quenching the cooling rate at a given point can be determined by measuring the rate of voltage change at the thermocouple junctions. Photographs.

11846 Individual Heat Treatment of Quality Rolls. *Industrial Heating*, v. 22, May 1955, p. 976-978.

Annealing, normalizing, quenching, tempering, and combination practices. Photographs.

11847 Heat Treating Dies in Salt Bath Furnaces Aids Production of Fastenings at H. M. Harper Co. K. G. Hookanson. *Industrial Heating*, v. 22, June 1955, p. 1153-1154, 1156, 1158.

Die hardening furnaces; heat-treat cycles. Photographs, diagram.

11848 Better Copper Tubing Starts With Accurately Controlled Annealing. Victor Peterson. *Iron Age*, v. 175, June 2, 1955, p. 87-89.

Accurate control over annealing cycles will give the grain size uniformity and scale-free surfaces so essential to the drawing qualities of Cu tubing. Photographs, micrographs.

11849 Heat Treating—1855 to 1955. *Iron Age (100th Anniversary Issue)*, v. 175, June 1955, p. 2C-14C.

Progress and outlook for fuels, furnaces, and procedures. Photographs.

11850* Martensite Tempering of Tool Steels. **Szerszámacélok martemperálása.** (Hungarian.) Ödön Szabó. *Kohászati Lapok*, v. 10, no. 6, June 1955, p. 262-272.

Experiments for evolving method of tool steel tempering in a salt bath, for decreasing rejects caused by deformation and quenching cracks. Tables, graphs, diagram, micrographs.

11851* Induction Heating of Al Cores. **Alumíniumtömbök indukciós hevítése.** (Hungarian.) László Zelenka. *Kohászati Lapok*, v. 10, no. 6, June 1955, p. 275-278.

Theoretical considerations, applicability, and effectiveness of process. Diagrams, graphs, tables. 8 ref.

11852 Change to Gas-Carburizing Improves Piston Pins. R. E. Haislip. *Materials & Methods*, v. 41, June 1955, p. 140-143.

Shorter production cycle resulted and uniformity increased markedly through each pin and from pin-to-pin. Photographs, tables, diagrams.

11853* Heat Treatment to Precision Limits. *Mechanical World and Engineering Record*, v. 135, May 1955, p. 228-229.

Heat treatment and case hardening of repetition parts to close limits in plants in which unique control equipment leaves no room for error. Photographs.

11854 Some Recent Furnace Installations. Applications in the Fabrication and Heat Treatment of Metals. *Metallurgia*, v. 51, no. 308, June 1955, p. 283-300.

Indicates trends of development in furnace design by showing and describing briefly a few of the more recent installations in England and the purposes for which they are being applied. Photographs, diagrams.

11855 Bright Hardening and Bright Tempering of Corrosion-Resistant and High-Temperature Alloys. T. W. Harker. *Metal Treating*, v. 6, May-June 1955, p. 2-4.

Heat treating equipment and cycles for fastenings and bolts for elevated temperature use. Photographs, micrograph.

11856 Commercial Heat Treating Shops in France. Bernard Jousset. *Metal Treating*, v. 6, May-June 1955, p. 12, 14-16, 37.

Equipment; materials; procedures. Photographs.

11857 A Review of Salt Bath Carburizing. I. E. N. Case. *Metal Treating*, v. 6, May-June 1955, p. 18-19.

Applications; advantages; processing details. Photographs. (To be continued.)

11858 Uniform Hardness for 410 Stainless Castings. W. B. F. Mackay. *Precision Metal Molding*, v. 13, June 1955, p. 40-41, 88.

Study of the effectiveness of various heat treatments. Photographs, micrograph, graphs.

11859* Induction Hardening and Its Applications. **Die Induktionshärtung und ihre Anwendung.** (German.) H. Voss. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 173-180.

Demonstrates the numerous uses of surface hardening by heating the hardenable metal with induced medium—or H.F. current. Photographs, tables. 7 ref.

11860 Heat Treating Aluminum. I. Wrought Alloys. II. Castings. W. A. Anderson. *Steel*, v. 136, June 6, 1955, p. 83-86, June 13, 1955, p. 146-148.

Data are presented on annealing, quenching, aging, cold treatment, and reheating of the alloys. Photographs, graphs, tables, micrograph.

Metals—Heat Treatment

11861 Heat Treating Magnesium. M. E. Brooks. *Steel,* v. 137, July 11, 1955, p. 88-91.

Treatment of Mg for the max. production of castings, extrusions, sheet, and plate products. Photographs, micrographs, tables.

11862 Gas Carburizing—A Controlled Production Tool. F. E. Russ. *Steel Processing,* v. 41, June 1955, p. 383-390.

Equipment; materials; methods. Photographs, graph.

11863* Hardening by Induction. Fred Spencer. *Tooling and Production,* v. 21, July 1955, p. 55-58, 66, 72.

Applications, advantages, and limitations of the method. Diagram, table, photographs. 5 ref.

11864* Vessels for the Annealing of Rolled and Drawn Objects. **Garnki do wyżarzania wyrobów walcowanych i ciągnionych.** (Polish.) Kazimierz Janas. *Wiadomości Hutnicze,* v. 11, no. 1, Jan. 1955, p. 18-20.

Properties of materials used for annealing vessels; factors affecting service life; effect of design of vessel on annealing time and temperature. Diagrams.

See also:

11901 (stress-relief of mild-steel)

METALS—MECHANICAL AND PHYSICAL PROPERTIES

11865* Direct Tensile Tests on Standard Rolled Sections Made on Steel A-37. (English.) F. Hebrant and L. Demol. *Acier, Stahl, Steel,* v. 20, no. 4, Apr. 1955, p. 173-177.

Comparison of the values of the elastic limit and of the ultimate strength, as obtained from tensile tests on standard test-pieces, with the corresponding values measured by means of direct tensile tests on normal rolled steel sections. Photographs, graphs, diagrams, tables.

11866* Tensile Tests on Riveted Connections of Rolled Sections Made of Steel A-37. (English.) F. Hebrant and L. Demol. *Acier, Stahl, Steel,* v. 20, no. 4, Apr. 1955, p. 178-184.

Tests were concerned with end connections of standard rolled sections with gusset-plates, such as are met with in small and medium-sized structures. Photographs, graphs, diagrams, tables. 6 ref.

11867* Initial Yielding Phenomena and Luder Lines in Drop Forgings of Some Al-Mg Alloys. **Fenomeni di snervamento iniziale e linee di Lüders nello stampaggio di talune leghe Al-Mg.** (Italian.) F. Sacchi and L. Mori. *Alluminio,* v. 24, no. 2, Mar. 1955, p. 121-127.

Appearance of Luder lines on fine grained and annealed alloys and absence of the lines in coarse grained and slightly hardened ones. Photographs, graphs, diagrams. 3 ref.

11868* Influence of Chromium and Manganese Impurities on Electric Properties of Aluminum. **Influenza delle impurezze di cromo e di manganese sulle proprieta dell' alluminio per uso elettrico.** (Italian.) T. Federighi. *Alluminio,* v. 24, no. 2, Mar. 1955, p. 129-133.

Effect of small Cr and Mn contents on commercial Al in electrical applications. Graphs, tables. 3 ref.

11869* Adaptation of the General Buckling Formula to the Conditions Prevailing in Aluminum Structural Parts. **Die Anpassung der allgemeinen Knickformel an die Berechnung von Aluminiumbauteilen.** (German.) K. Sutter. *Aluminium,* v. 31, no. 5, May 1955, p. 215-217; disc., p. 217-218.

Formula to compute the resistance of Al bars to torsion, bending, or localized buckling under compressive stress. Graph, photograph. 1 ref.

11870* High Creep-Resistant Cast Aluminum Alloys With Magnesium and Silicon. **Aluminium-Gusslegierung hoher Dauerstandfestigkeit mit Magnesium und Silizium.** (German.) H. Vosskühler. *Aluminium,* v. 31, no. 5, May 1955, p. 219-222.

Data on creep-stress resistance and other mechanical properties of Al alloys with 5 to 6% Mg, 1.7 to 2.0% Si, and about 0.5% Cu. Tables, graphs. 7 ref.

11871 The Stress-Rupture Strength of Type 347 Stainless Steel Under Cyclic Temperature. E. E. Baldwin. *American Society of Mechanical Engineers, Paper No.* 54–A-231, 1954, 17 pages + 5 plates. (TJ1 Am35p)

Stress-rupture tests of type 347 stainless steel were conducted in liquid Na under constant and cyclic temperature conditions. Constant-temperature tests were conducted at temperatures between 1000 and 1200 F and cycle times ranged from 6 to 12 hr. Tables, diagrams, photographs, graphs, micrographs. 11 ref.

11872 An Investigation of Strain Aging in Fatigue. J. C. Levy and G. M. Sinclair. *American Society for Testing Materials, Preprint No.* 70, 1955, 22 p. (TA401 Am35p)

Application of strain-aging theory to account for a peak in fatigue life occurring at about 450 F. Graphs, photographs, micrographs, diagrams, tables. 34 ref.

11873 Understressing as a Means of Eliminating the Damaging Effect of Fatigue Stressing. H. E. Frankel and J. A. Bennett. *American Society for Testing Materials, Preprint No.* 71, 1955, 9 p. (TA401 Am35p)

Rotating-beam tests of a heat-treated alloy steel showed that the fatigue limit could be increased by coaxing. Damaging effect of fatigue stressing 10% above the fatigue limit was eliminated by understressing and coaxing. Tables, graphs. 9 ref.

11874 The Fatigue Properties of Some Titanium Alloys. A. W. Demmler, Jr., M. J. Sinnott, and L. Thomassen. *American Society for Testing Materials, Preprint No.* 72, 1955, 13 p. (TA401 Am35p)

Rotating-beam fatigue life characteristics of three commercial Ti alloys: Ti-75A, RC-130B, and RC-A-110AT, and two experimental alloys: 6% Al, an all-α alloy, and 30% Mo, an all-β alloy. Tables, graphs, diagram. 7 ref.

11875 Torsion Prestrain and the Fatigue Strength of RC-55 Titanium Alloy. J. G. Kaufman and E. D'Appolonia. *American Society for Testing Materials, Preprint No.* 73, 1955, 14 p. (TA401 Am35p)

Rotating-beam fatigue tests. Torsional prestrain ranged from 5 to 60% of the torsional strain to failure. Data from tests of torsionally prestrained specimens were compared with data from tests of otherwise similar specimens that had not been prestrained. Tables, graphs. 10 ref.

11876 Anisotropy of Fatigue Strength of a Steel and Two Aluminum Alloys in Bending and in Torsion. W. N. Findley and P. N. Mathur. *American Society for Testing Materials, Preprint No.* 75, 1955, 15 p. (TA401 Am35p)

A somewhat similar variation of the fatigue strengths with orientation relative to the texture was observed for all three metals. Fatigue strength in bending decreased as the orientation changed from longitudinal to diagonal to transverse; and the fatigue strength in torsion was nearly constant at all three orientations. Tables, micrographs, diagrams, graphs. 30 ref.

11877 The Behavior of Long Helical Springs Under Fluctuating Load. C. L. Staugaitis and H. C. Burnett. *American Society for Testing Materials, Preprint No.* 76, 1955, 6 p. (TA401 Am35p)

Machine was constructed for testing long springs, operating on a guide rod, under fluctuating compressive loads. Results of tests on this machine showed that wear on the spring due to the guide rod reduced the life of the long springs far below that of the short springs tested at the same stress range. Photograph, tables, graphs, micrographs.

11878 The Effect of an Onodic (HAE) Coating on the Fatigue Strength of Magnesium Alloy Specimens. J. A. Bennett. *American Society for Testing Materials, Preprint No.* 77, 1955, 5 p. (TA401 Am35p)

Bending fatigue tests of coated and uncoated specimens were made in machines of the constant-amplitude-of-deflection type. Results showed that the coating caused a significant reduction in fatigue strength even when the stress on the coated specimens was calculated on the assumption that all the load was supported by the underlying metal. Table, diagrams, graph, micrographs.

11879 Effect of Strain—Rate History on the Creep Behavior of an Alloy Steel at 800 F. H. A. Lequear and J. D. Lubahn. *American Society for Testing Materials, Preprint No.* 78, 1955, 5 p. (TA401 Am35p)

Quickly strained specimens had about 30 times the creep rate of slowly strained specimens immediately after being brought to a common stress. Graphs, table. 3 ref.

11880 Effect of Time and Temperature on Impact and Tensile Properties of Hot-Rolled Low-Carbon Steels During Strain-Aging. F. Garofalo, G. V. Smith, and D. C. Marsden. *American Society for Testing Materials, Preprint No.* 79, 1955, 11 p. (TA401 Am35p)

Upon straining and aging at 75 F, or exposing strained and fully aged material at 450 F, a pronounced shift in the notch-impact transition-temperature range to higher temperatures was found. Tables, graphs, micrographs. 10 ref.

11881 Mchanical Properties of a Magnesium Alloy Under Biaxial Tension at Low Temperatures. Edward Paxson, Joseph Marin, and L. W. Hu. *American Society for Testing Materials, Preprint No.* 80, 1955, 13 p. (TA401 Am35p)

Properties in both simple and biaxial tension were obtained at various low temperatures. Biaxial tensile properties were determined by the bulge-type test, using a thin circular plate clamped at the edges and subjected to lateral hydrostatic pressures. Photographs, diagrams, graphs. 15 ref.

11882 Strength of Bent Copper Tube. G. S. Sangdahl, Jr. and W. M. Baldwin, Jr. *American Society for Testing Materials, Preprint No.* 81, 1955, 20 p. (TA401 Am35p)

Provides evidence that, in spite of thinning of the wall, the bursting strength of Cu tube is not impaired by bending. Graphs, diagrams, tables, photographs. 14 ref.

11883 A Hardness Conversion Table for Copper-Beryllium Alloy Strip. G. R. Gohn. *American Society for Testing Materials, Preprint No.* 82, 1955, 10 p. (TA401 Am35p)

For material in the as-rolled condition having a tensile strength within the range of 70,000 to 132,000 psi., conversion values, based upon material having the same tensile strength, are given for diamond pyramid hardness numbers taken with both a 2½- and a 5-kg. load, as well as for the Rockwell B, and Rockwell superficial 30T scales. Tables, graphs.

11884 Certain Departures From Plastic Ideality at Large Strains. H. A. Lequear and J. D. Lubahn. *American Society for Testing Materials, Preprint No.* 87, 1955, 20 p. (TA401 Am 35p)

Studies on high-purity Cu to relate the results of creep and tension tests. Diagram, graphs. 17 ref.

11885 An Axial Loading Creep Machine. M. H. Jones and W. F. Brown, Jr. *American Society for Testing Materials, Preprint No.* 89, 1955, 7 p. (TA401 Am35p)

Factors influencing the eccentricity of loading in tension testing and a creep machine designed to reduce stresses in tension creep to a minimum. Circuit diagram, diagrams, graphs, photographs. 6 ref.

11886 A Remotely Operated Extensometer. R. G. Berggren and J. C. Wilson. *American Society for Testing Materials, Preprint No.* 90, 1955, 4 p. (TA401 Am35p)

A sensitive extensometer for use in remotely controlled tension testing of radioactive metallic specimens. Diagram, circuit diagram, photograph.

11887 Longitudinal Impact Tests of Long Bars With a Sligshot Machine. W. Ramberg and L. K. Irwin. *American Society for Testing Materials, Preprint No.* 93a, 1955, 14 p. (TA401 Am35p)

Slingshot machine for making impact tests at the National Bureau of Standards. Results obtained from these tests on bars of steel and Cu are given. Diagrams, photograph, table, graphs. 21 ref.

11888 Reproducibility of Charpy Impact Test. David E. Driscoll. *American Society for Testing Materials, Preprint No.* 93d, 1955, 5 p. (TA401 Am35p)

To demonstrate the reproducibility and reliability of the test, a special heat of steel was cut to make 18,000 blanks and heat treated to three energy levels. These specimens were used to make tests on various machines. Graphs, tables.

11889 Influence of Boron on Cast Cobalt-Base S-816 Alloy. W. E. Blatz, E. E. Reynolds, and W. W. Dyrkacz. *American Society for Testing Materials, Preprint No.* 94a, 1955, 8 p. (TA 401 Am35p)

Cast Co-base alloys with stress-rupture properties at 1650 F, equivalent to those of S-816 alloy at 1500 F, were developed. Graphs, table, micrographs.

11890 Effect of Rare Earth Additions on the High-Temperature Properties of a Cobalt-Base Alloy. J. E. Breen and J. R. Lane. *American Society for Testing Materials, Preprint No.* 94c, 1955, 9 p. (TA401 Am35p)

Improvements in the high-temperature mechanical properties of a typical Co-base alloy were achieved by the addition of rare earths as misch metal. Tables, graphs, photograph. 10 ref.

11891 The Effect of Heat Treatment and Structure Upon Creep Properties of Nimonic Alloys Between 750 and 950 C. W. Betteridge and R. A. Smith. *American Society for Testing Materials, Preprint No.* 94d, 1955, 1955, 11 p. (TA401 Am35p)

Results of tests on Ni-Cr-Co alloys hardened with Ti and Al show that differences in the stress-rupture properties at 750 C, whether due to differences in heat treatment, are maintained at all temperatures up to 950 C. Tables, graphs, micrographs. 9 ref.

11892 Tension and Torsion Tests on Nimonic Alloys at High Temperatures. E. D. Ward and W. G. Tallis. *American Society for Testing Materials, Preprint No.* 94e, 1955, 11 p. (TA401 Am35p)

Data obtained in conventional tension and torsion tests, at temperatures from 20 to 1000 C (70 to 1830 F), on the Ni-Cr-base alloys Nimonic 75 and 80A and the Ni-Cr-Co-base alloys Nimonic 90 and 95. Table, graphs.

11893 Compression-Creep Properties of Several Metallic and Cermet Materials at High Temperatures. L. A. Yerkovich and G. J. Guarnieri. *American Society for Testing Materials, Preprint No.* 94f, 1955, 23 p. (TA401 Am35p)

Investigations to develop suitable test apparatus and obtain compression-creep for various metals and cermets. Tables, diagrams, photographs, graphs. 12 ref.

11894* Thermal Conductivity of Nickel Below and Above the Curie Point. **La conductivité thermique du nickel de part et d'autre du point de curie.** (French.) Lionel Hugon and Jean Jaffray. *Annales de physique*, v. 10, ser. 12, June 1955, p. 377-385.

Study of thermal conductivity of Ni from ordinary temperature to 650 C, and behavior as it crosses the Curie point. Diagram, tables, graphs. 11 ref.

11895* Thermodynamic Analysis. **Zur thermodynamischen Analyse. II.** The Heat-Content Curve of a Substance From a Single Calorimetric Experiment. **Die Wärmeinhaltskurve eines Stoffes aus einem einzigen kalorimetrischen Versuch.** (German.) Willy Oelsen, Karl Heinz Rieskamp, and Olaf Oelsen. *Archiv für das Eisenhüttenwesen*, v. 26, no. 5, May 1955, p. 253-266.

New simple calorimetric method for measuring the heat contents of substances, especially of metals, over wide temperature ranges. Diagrams, graphs, table. 31 ref.

11896* Relation Between Appearance of Deformation of Twin Crystals and Type of Fracture in Alpha-Iron. **Zusammenhang zwischen dem Auftreten von Verformungszwillingen und der Bruchart beim Alpha-Eisen.** (German.) Herbert Buchholtz, Franz Braumann, and Albert Eier. *Archiv für das Eisenhüttenwesen*, v. 26, no. 6, June 1955, p. 337-344.

Determination of the influence of the rate of uniaxial stress and temperature on type of fracture and appearance of the deformation of twin crystals for four types of steel subjected to different heat treatments. Photographs, micrographs, graphs, diagram, tables. 5 ref.

Metals—Mechanical and Physical Properties

11897* Measuring the Direct-Current Magnetization Curve and Hysteresis Curve. **Messung der Gleichstrommagnetisierungskurve und der Hysteresisschleife.** (German.) Hans Neumann. *Archiv für technisches Messen*, 1955, no. 232, May, p. 105-108.

Practical suggestions on the determination of magnetic properties. Graphs. 14 ref.

11898* Activity Coefficients of Metals in Liquid Ternary Solutions. **Współczynniki aktywności metali w roztworach trójskładnikowych.** (Polish.) Władysław Ptak. *Archiwum Górnictwa i Hutnictwa*, v. 3, no. 1, 1955, p. 69-87.

Formulas for several ternary liquid solutions are worked out; effect of temperature and composition on activity coefficients. Tables, phase diagrams. 3 ref.

11899 Interaction of Friction and Temperature at the Chip-Tool Interface in Metal Machining. F. F. Ling and Edward Saibel. *ASME, Transactions*, v. 77, July 1955, p. 693-700.

An approximate analysis of the interface temperature, or cutting temperature, is given for linear friction-temperature characteristics and small rake angles, for orthogonal metal machining. Graphs, diagrams.

11900* Contact Stresses and Fatigue Fractures of Babbitt Bearings for Automobiles and Tractors. **Kontaktnye napriazheniia i ustalostnye razrusheniia avtotraktornykh babbitovykh podshipnikov.** (Russian.) M. I. Baulin. *Avtomobil'naia i traktornaia promyshlennost'*, 1955, no. 5, May, p. 17-19.

Babbitt linings are tested for fatigue by repeated bending and compression accompanied by the force of friction on the surface of the material. Patterns of crumbling and cracks are established. Photographs, diagrams.

11901 Effect of Various Stress-Relieving Treatments on the Behaviour of Welded and Notched Mild-Steel Specimens Under Impact Loading. G. Coates. *British Welding Journal*, v. 2, June 1955, p. 266-275.

Impact tests on notched steel bars into which residual welding stresses were introduced. A comparison is made between the effectiveness of various stress-relieving treatments in improving impact performance. Heat-treatment at 650 C is shown to have a greater influence than the other methods of stress-relief. Diagrams, graphs, tables, photographs, micrographs. 6 ref.

11902 Interatomic Bond Strength and Static Distortions in Crystals of Alloyed Ferrite. V. A. Il'ina and V. K. Kritskaya. *Henry Brutcher Translation No.* 3511, 7 p. (From *Doklady Akademii Nauk SSSR*, v. 100, no. 1, 1955, p. 69-72.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 6999, v. 4, May 1955.

11903 Cases of Damage to Steam Turbines and How to Prevent Such Damage. E. Pohl. *Henry Brutcher Translation No.* 3512, 7 p. (Abridged from *Stahl und Eisen*, v. 71, no. 25, 1951, p. 1375-1379.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 1388, v. 1, Feb. 1952.

11904 Structural Engineering Aspects. A. M. Freudenthal. Paper from BUILDING MATERIALS—THEIR ELASTICITY AND INELASTICITY. p. 64-121. 1954. Interscience Publishers, New York. (TA407 R27b)

Implications of the rheological behavior of the principal engineering materials in terms of the performance of engineering structures. Diagrams, graphs, table. 9 ref.

11905 Ferromagnetic Domain Patterns on Single Crystals and Bicrystals of Nickel. Ursula M. Martius and K. V. Gow. *Canadian Journal of Physics*, v. 33, May 1955, p. 225-234.

Investigation of the effect of crystal boundaries on the domain structure. Diagram, table, micrographs. 13 ref.

11906 Effects of Hydrogen at High Pressures on the Mechanical Properties of Metals. I. Apparatus, Procedures, and Preliminary Results. H. C. Van Ness and B. F. Dodge. *Chemical Engineering Progress*, v. 51, June 1955, p. 266-271.

Embrittlement, not H attack, appears in steels and other alloys at as low as 2,000 atmospheres pressures at room temperature. Tests made up to 4,000 atmospheres and to 475 C show austenitic stainless steel to be most suitable. Tables, diagrams, photographs, micrographs. 11 ref.

11907* The Symmetry of Textiles of Rolled Uranium. **Sur la symétrie des textures de l'uranium laminé.** (French.) Anatole Winogradzki. *Comptes rendus*, v. 240, no. 23, June 6, 1955, p. 2235-2237.

Analysis of X-ray symmetry diagrams of very pure U specimens. Diagrams, X-ray diffractograms.

11908* Effect of Order or Disorder on the Hall Effect in Ferromagnetic Alloys. **O vliianii uporiadocheniia na effekt Kholla v ferromagnetikakh.** (Russian.) N. S. Akulov and A. V. Cheremushkina. *Doklady Akademii Nauk SSSR*, v. 102, no. 1, May 1, 1955, p. 45-47.

General formula permits a quantitative determination of Hall's constant with respect to the resistivity of the alloy in relation to temperature and to the degree of order. Graphs. 9 ref.

11909 Reaction of Nitrogen With Uranium. M. W. Mallett and A. F. Gerds. *Electrochemical Society, Journal*, v. 102, June 1955, p. 292-296.

Rates of reaction were determined by volumetric measurements in the temperature range 550 to 900 C at atmospheric pressure. Reactions were found to follow a parabolic rate law with some deviations initially and also after the period of parabolic reaction. Micrographs, graphs, table. 4 ref.

11910 A Metallurgical Evaluation of Iodide Chromium. D. J. Maykuth, W. D. Klopp, R. I. Jaffee, and H. B. Goodwin. *Electrochemical Society, Journal*, v. 102, June 1955, p. 316-331.

Both the physical condition and the purity of Cr are important factors in its ductility. Small quantities of O, N, Fe, Mo, W, and Si have little effect on the bend ductility of Cr. However, Ni, C, or S adversely affect both the hot and cold ductility. Tables, graphs, micrographs. 13 ref.

11911* Malleable Cu-Cr Alloys as a Material for the Electric Industry. **Kupfer-Chrom-Knetlegierungen als Werkstoff für die Elektrotechnik.** (German.) Hans-Gerhard Petri and Hugo Vosskühler. *Elektrotechnische Zeitschrift*, v. 76, Ausgabe A, no. 11, June 1955, p. 380-385.

Effect of heat treatment and cold working on electrical properties at normal and elevated temperatures. Graphs, photograph, tables, diagram. 12 ref.

11912 Cumulative Damage in Fatigue: A Method of Investigation Economical in Specimens. John C. Levy. *Engineering*, v. 179, June 10, 1955, p. 724-726.

On the assumption that the scatter of a series of results is due to local conditions pre-existing within each particular specimen, it was presumed that a specimen which showed an unduly long, or an unduly short, life under one applied stress would have shown a similarly long or short life under a different level of stress. Graphs, table. 14 ref.

11913 The Liability to Fatigue Failure of Aluminium-Alloy Structures. Tibor Haas. *Engineers' Digest*, v. 16, May 1955, p. 253-257.

An approach to the problem through the use of program-loading fatigue testing machines. Photographs, micrographs, graphs, diagrams. 13 ref.

11914* Study of Correlations Between Different Mechanical Tests of Current Gray Irons. **Étude des corrélations entre différents essais mécaniques des fontes grises courantes.** (French.) François Danis and Étienne Doat. *Fonderie*, 1955, no. 111, Apr., p. 4451-4464.

Describes tensile-bending, shearing and hardness, and shearing-elastic modulus correlations of 20- and 30-mm. diameter bars. Influence of heterogeneity of structure. Graphs, tables, diagrams. 6 ref.

11915* Influence of Phosphorus on the Correlation Between Brinell Hardness and Other Characteristics of Gray Irons. **Influence du phosphore sur la corrélation entre la dureté Brinell et les autres caractéristiques des fontes gises.** (French.) Jean Guillamon. *Fonderie*, 1955, no. 112, May, p. 4513-4525.

Determination of mechanical properties; values of equivalent C content. Graphs, phase diagrams, tables. 38 ref.

11916* The Chemical Composition of Gray Iron and Its Tensile Strength. **Die chemische Zusammensetzung des grauen Gusseisens und seine Zugfestigkeit.** (German.) Paul A. Heller and Hans Jungbluth. *Giesserei*, v. 42, no. 10, May 12, 1955, p. 255-257.

Effect of wall thickness and degree of saturation on tensile strength. Graphs, tables. 15 ref.

11917* Micro-Examination of Dynamic Fatigue. **Sledování dynamické únavy mikroroentgenem.** (Czech.) Petr Skulari and Vladivoj Očenášek. *Hutnické Listy*, v. 10, no. 5, May 1955, p. 279-284.

Suppositions for the practical use of the examination and results obtained for Al and its alloys under alternating dynamic loads. Explains the physical principles of fatigue related to material in annealed and hardened conditions. Graphs, micrographs, diagrams, table. 9 ref.

11918* Effect of Tungsten Upon Tendency to Temper Brittleness. **Vliv wolframu na sklon k popouštěcí křehkosti.** (Czech.) Josef Čadek. *Hutnické Listy*, v. 10, no. 5, May 1955, p. 285-293.

Studies the effect of W on the transition temperature of Cr, Cr-V, and Cr-Ni steels. Graphs, table, photograph. 19 ref.

11919 The Significance of Microhardness Testing. A. P. Miodownik. *Institute of Metals, Journal*, v. 83; *Institute of Metals, Bulletin*, v. 2, June 1955, p. 258-262.

Deviations and scatter encountered in micro-hardness testing at low loads are examined, and their causes attributed to mechanical and physical characteristics of the testing instrument, operational factors, and the micro-structure of the specimen. Diagrams. 47 ref.

11920 The Effect of Nitrides and Ternary Intermetallic Compounds on the Young's Modulus of Some Aluminium Alloys. N. Dudzinski. *Institute of Metals, Journal*, v. 83, June 1955, p. 444-448 + 1 plate.

Various binary and ternary Al alloys were prepared by chill-casting or sintering and extrusion, and their elastic properties were investigated. It was found that the presence of nitrides of Al, Cr, Mg, Fe, V, and Ti caused an appreciable increase in Young's modulus. Tables, micrographs. 10 ref.

11921 Plastic Deformation of Aluminium-3.5% Copper Alloy Single Crystals. K. M. Carlsen and R. W. K. Honeycombe. *Institute of Metals, Journal*, v. 83, June 1955, p. 449-454 + 1 plate.

Long crystals of an Al-3.5% Cu alloy, prepared by the strain-anneal method, enabled a comparison to be made of specimens of identical orientation after different heat-treatments. Graphs, micrographs. 10 ref.

11922 Tensile Properties of Some Titanium Alpha Solid Solutions up to 600° C. J. W. Suiter. *Institute of Metals, Journal*, v. 83, June 1955, p. 460-464 + 1 plate.

The ultimate tensile stress and elongation to fracture were measured for two series of binary Ti alloys, one containing N, O, or C; the other containing Al, Sn, or Zr. Graphs. 6 ref.

11923* **The Effect of Grinding on the Fatigue Strength of Steels.** D. N. Cledwyn-Davies. *Institution of Mechanical Engineers, Proceedings*, v. 169, no. 2, 1955, p. 83-92.

Investigation to determine the effects of cylindrical grinding on the fatigue strength of a Ni-Cr-Mo alloy steel hardened and tempered to give a nominal ultimate stress of 80 tons per sq. in. or 62 tons per sq. in., and carbon steel at 45 or 27 tons per sq. in. Photographs, graphs, diagrams, tables. 9 ref.

11924 How Important Is Hydrogen Embrittlement? N. J. Grant and J. L. Lunsford. *Iron Age*, v. 175, June 2, 1955, p. 92-94.

Hydrogen absorption can permanently affect the ductility of cold-worked steel. Micrograph, graphs. 1 ref.

11925 Modern Rolling Mills Aid Study of High Strength Materials. J. I. McMartin. *Iron Age*, v. 175, June 23, 1955, p. 104-106.

Equipment and operating details of heavier, sturdier laboratory rolling mills, offering greater control and increased flexibility to meet modern metallurgical needs. Improved mills are designed to handle many new high hardness and high strength materials. Photographs.

11926 Reproducibility of Wöhler-Type Fatigue Tests. J. Clayton-Cave, R. J. Taylor, and E. Ineson. *Iron and Steel Institute, Journal*, v. 180, June 1955, p. 161-169.

A study of the variabilities of fatigue test results obtained from individual testing machines, a battery of 12 testing machines of identical design, and a number of similar design in different laboratories. Tables, diagrams, graphs. 9 ref.

11927* Interrelationship Between Composition, Temperature, and Heat Resistance. **Sootnoshenie mezhdu sostavom, temperaturoi i zharoprochnost'iu. II.** Alloys of a Ternary System of Nickel-Chromium-Titanium. **Splavy troinoi sistemy nikel'-khrom-titan.** (Russian.) I. I. Kornilov and V. V. Kosmodem'ianskii. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 2, Feb., p. 90-97.

Optimum compositions of the most heat-resistant alloys determined for several ranges of temperatures. Problem of degree of homogeneity of structure. Graphs. 8 ref.

11928* Heat Content and Mechanical Properties of Metals. **Teplosoderzhanie i mekhanicheskie svoistva metallov.** (Russian.) K. A. Osipov and S. G. Fedotov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 2, Feb., p. 98-104.

Relation of heat content of liquid metals at the melting point to the strength, hardness, and plastic properties of the solidified metals. Graphs, tables. 30 ref.

11929* Quantitative Determination of Machine Parts Wear With Radioactive Indicators. **Kolichestvennoe opredelenie iznosa detalei mashin metodom radioaktovnykh indikatorov.** (Russian.) Iu. S. Zaslavskii and G. I. Shor. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 4, Apr., p. 43-52.

Comparison with results by suspension method; testing equipment and methods; choice of lubricants. Diagrams, graphs, tables, oscillogram. 15 ref.

11930* Temperature Effect on the Plasticity and Deformation Resistance of Technical Titanium. **Vliianie temperatury na plastichnost' i soprotivliaemost' deformatsii tekhnicheskogo titana.** (Russian.) E. M. Savitskii and M. A. Tylkina. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 4, Apr., p. 53-57.

Micro-structure, tensile and compression strengths, hardness, etc., of C and C-free Ti, tempered and untempered. Graphs, micrographs, diagrams. 4 ref.

11931* Influence of Annealing Treatments at About 650 C After Work Hardening on Impact Properties of Soft Steels. **Inverkan på slagseghetsegenskaperna hos mjuka stål av glödgningsbehandlingar vid 650°C efter kalldeformation.** (Swedish.) G. Sehlberg. *Jernkontorets Annaler*, v. 139, no. 4, 1955, p. 215-224.

Study of low C steels subjected to cold working by stretching and subsequent cold working. Micrographs, graphs, tables.

11932* Deformation Phenomena and Aging Effects in Torsion Testing of Cold Drawn Low Carbon Steel Wire. **Några deformations- och åldringsfenomen vid vridning av kalldragen tråd av mjuka stål.** (Swedish.) Åke Josefeson. *Jernkontorets Annaler*, v. 139, no. 4, 1955, p. 225-249.

A rise in the N content from 0.003 to 0.006% results in a pronounced decrease in the number of turns to fracture, when a cold drawn low C steel wire is twisted. Tables, graphs, micrographs.

11933* A Comparison Between Impact Test Pieces According to Schnadt and to Charpy. **Jämförelse mellan slagprovstavar enlight Schnadt och Charpy.** (Swedish.) Cyrill Schaub. *Jernkontorets Annaler*, v. 139, no. 5, 1955, p. 326-346.

Comparison between these types of test pieces was based on determinations of the position of the lower boundary of the transition range, defined as the highest temperature at which no single impact value exceeds 2 kg.-m. per sq. cm. Diagrams, photographs, graphs, tables. 9 ref.

Metals—Mechanical and Physical Properties

11934 Fatigue Life of Airplane Structures. Bo Lundberg. *Journal of the Aeronautical Sciences*, v. 22, June 1955, p. 349-402; disc., p. 403-413.

Survey of the various aspects of the fatigue of complete airplane structures, together with numerical applications. Graphs, tables, photographs. 64 ref.

11935 Energy Relations in Cold Working an Alloy at 78°K and at Room Temperature. J. S. L. Leach, E. G. Loewen, and M. B. Bever. *Journal of Applied Physics*, v. 26, June 1955, p. 728-731.

The energy relations associated with plastic deformation by cold working of a 75% Au-25% Ag alloy at two temperatures were investigated. The energy stored in the chips was measured by Sn solution calorimetry and the total energy expended in the deformation was determined from dynamometer measurements. Diagrams, tables, graph. 10 ref.

11936 Liquid Surface Tension Measurements by Analysis of Solid-State Curvatures; The Surface Tension of Liquid Germanium. R. C. Sangster and J. N. Carman, Jr. *Journal of Chemical Physics*, v. 23, June 1955, p. 1142-1145.

Procedure, based on zone-melting techniques, developed for determining liquid-gas surface tension coefficients; Ge at its melting point, in contact with He or N, has a surface tension of 632.5 dynes per cm. Graphs, diagrams, photograph. 9 ref.

11937* Heat Transfer Experiments With Sodium and Sodium Potassium Alloy. W. B. Hall and A. E. Jenkins. *Journal of Nuclear Energy*, v. 1, June 1955, p. 244-263.

Theoretical approach to the problem of heat transfer in liquid metals is briefly reviewed. Description of experiments in which the heat-transfer coefficients between two annuli, each carrying a flow of liquid metal, were measured. Graphs, diagrams, table.

11938* Effect of Atomic-Pile Radiation on the Elastic Modulus of an Austenitic Steel. A. Charlesby, N. H. Hancock, and H. C. Sansom. *Journal of Nuclear Energy*, v. 1, June 1955, p. 264-279 + 1 plate.

A sensitive method designed for measuring changes in the elastic modulus of a metal during irradiation in an at. pile. Photographs, tables, graphs, diagram, circuit diagram.

11939* Studies of the Solid State at High Temperature Carried Out by Means of Ultrasound. **Recherches sur l'état solide a haute température effectuées au moyen d'ultrasons.** (French.) Piero Giorgio Bordoni. *Journal de physique et le radium*, v. 16, no. 4, Apr. 1955, p. 285-291.

Elastic and inelastic properties of metals in the vicinity of their melting point; relation between increase of temperature and the values of Young's modulus and the shear modulus. Graphs, tables. 18 ref.

11940* Investigation on the Electrical Resistance Alloys of Copper, Manganese, and Tin. (English.) Hideo Nishimura and Masao Adachi. *Kyoto University, Engineering Research Institute Technical Reports*, v. 4, no. 3, Sept. 1954, p. 37-72.

Investigation of the electrical properties of the ternary Cu alloys, containing 2-18% Mn and 4-10% Sn, revealed that annealing at low temperature decreases the electrical resistance and increases the temperature coefficient of cold drawn specimens. Tables, diagrams, graphs, micrographs. 59 ref.

11941* Studies of Fatigued Railway Rails. I. Decision on the Degree of Fatigue of Railway Rails by a Magnetic Flaw Detector. (English.) Ichirō Konishi, Minoru Kawamoto, Hideo Miki, Masao Adachi, Bunji Kondō, Jin-ichi Takamura, Yoshiji Niwa, and Hisao Gotō. *Kyoto University, Engineering Research Institute Technical Reports*, v. 5, no. 2, Mar. 1955, p. 19-52.

The relation between the magnetic flaw detecting record of rails and the dynamic character and fatigue or breakage of business track rails are described. Photograph, graphs, diagrams, tables, micrographs. 5 ref.

11942* Effects of Sliding Velocity & Temperature on Wear & Friction of Several Materials. R. L. Johnson, M. A. Swikert, and E. E. Bisson. *Lubrication Engineering*, v. 11, May-June 1955, p. 164-170.

Materials; apparatus and procedures; results. Table, diagram, graphs. 17 ref.

11943 Low-Expansion Cast Iron. Harold Brown. *Machine Design*, v. 27, June 1955, p. 175-177.

Properties and design characteristics of a Ni cast iron capable of holding precision dimensions under local heating conditions. Photograph, graph, micrograph, table.

11944 Soft Magnetic Materials. W. S. Melville. Paper from MAGNETIC ALLOYS AND FERRITES. p. 37-84. 1954. George Newnes. London. (QC761 Sa98m)

Important characteristics and factors affecting their properties in limiting commercial applications. Tables, graphs, diagrams. 24 ref.

11945 Non-Magnetic Ferrous and Magnetic-Compensating Alloys. C. Gordon Smith. Paper from MAGNETIC ALLOYS AND FERRITES. p. 171-178. 1954. George Newnes, London. (QC761 Sa98m)

Properties and application of non-magnetic steels, cast irons, and magnetic compensating alloys. Graphs, tables. 9 ref.

11946* Fatigue of Metals—Our Knowledge and the Deficiencies in Our Knowledge. (English.) P. L. Teed. *Metalen*, v. 10, no. 10, May 31, 1955, p. 147-151.

Effect of surface treatment on fatigue properties. Tables. 67 ref. (To be continued.)

11947 The Effect of Chromium Plating on the Fatigue Strength of Steel. C. Williams and R. A. F. Hammond. *Metal Industry*, v. 86, May 27, 1955, p. 435; disc., p. 435-438.

Results of tests to determine fatigue strength of chrome plated steels at varying heat treatment temperatures. (To be continued.)

11948* Effects of Corpuscular Radiation on Hardenable Alloys. **Effekte von Korpuskularbestrahlung an aushärtbaren Legierungen.** (German.) B. Neumann and E. Schmid. *Metall*, v. 9, no. 9-10, May 1955, p. 349-352.

Alpha, β, and neutron rays did not affect hardness but increased the electrical resistance of 2.15% Be–97.85% Cu alloy. Tables, graphs. 8 ref.

11949* Segregation of Copper From Supersaturated Solid Zinc Solution. **Über die Ausscheidung von Kupfer aus dem übersättigten Zink-Mischkristall.** (German.) W. Gruhl. *Metall*, v. 9, no. 9-10, May 1955, p. 353-357.

Dilatometric, microscopic, and X-ray investigations; effect of Cu segregation on hardness and electrical resistance. Graphs, micrographs, X-ray picture. 11 ref.

11950* Conductivity Measurements on Electrolytically Produced Metal Foils. **Leitfähigkeitsmessungen an galvanisch erzeugten Metallfolien.** (German.) Albert Keil. *Metalloberfläche*, Ausgabe A, v. 9, no. 6, June 1955, p. 81-84.

Measurement with eddy-current testing instrument and results compared with known conductivities of compact metals. Photographs, tables, graph. 5 ref.

11951 A Practical Strain-Hardening Function. E. Voce. *Metallurgia*, v. 51, no. 307, May 1955, p. 219-226.

Relationship between stress and indentation hardness is reviewed in the light of the exponential function, and the nature of the fillet connecting the strain-hardening curve with the elastic line is indicated. Graphs, tables. 13 ref.

11952* Performance Tests on Rockwell Hardness Indentors. R. S. Marriner. *Metalworking Production*, v. 99, June 24, 1955, p. 1145-1149.

To establish an irreproachable standard of hardness, it is necessary to determine to what extent reproducibility of the standard is limited by the choice of indentor used. This article describes some preliminary work which has been carried out at the National Physical Laboratory. Tables, diagrams, graphs.

11953* Influence of Temperature on the Poisson Coefficient of Refractory Steels. **Influence de la température sur le coefficient de Poisson des aciers réfractaines.** (French.) Louis Raymondin. *Métaux, Corrosion-Industries*, v. 30, no. 355, Mar. 1955, p. 93-104.

Poisson coefficient is obtained from data based on combined torsion and bending tests. Influence of a structural change on Poisson coefficient. Diagrams, tables, photograph, graphs, micrographs. 12 ref.

11954* Contemporary Problems of the Theory of Plasticity. **Sovremennye voprosy teorii plastichnosti.** (Russian.) A. A. Il'iushin. *Moskovskogo Universiteta Vestnik, Seriia Fiziko-Matematicheskikh i Estestvennykh Nauk,* 1955, nos. 4-5, Apr.-May, p. 101-113.

Discusses theories of small elastoplastic deformations, plastic flow, creep of metals, strength of structural materials and concrete, etc. 45 ref.

11955* Tangential Modulus in Some Metals Near the Melting Point. (English.) P. G. Bordoni and M. Nuovo. *Nuovo cimento (Supplemento),* v. 1, ser. 10, no. 2, 1955, p. 155-158; disc., p. 158.

Investigation of the elastic behavior of Sn, Pb, and Bi at high temperature. Graphs. 7 ref.

11956 Some Magnetic Properties of Dilute Ferromagnetic Alloys. I. G. Bate, D. Schofield, and W. Sucksmith. *Philosophical Magazine,* v. 46, 7th ser., no. 377, June 1955, p. 621-631.

Investigation into the variation with heat treatment of the magnetic properties of Cu-Co and Cu-iron containing small percentages of ferromagnetic component. Table, graphs, diagrams. 14 ref.

11957 Electrical Resistance of Copper-Gold Alloys at Low Temperatures. Elio Passaglia and William F. Love. *Physical Review,* v. 98, ser. 2, May 15, 1955, p. 1006-1010.

Electrical resistance of a series of five alloys in quenched and annealed states was studied from room temperature to about 2 K. The composition of the alloys was 25, 37.5, 50, 62.5, and 75 at. % Au. Graphs, tables. 7 ref.

11958* Theoretical Study of Residual Resistance of Binary Alloys Containing Foreign Atoms in Small Concentration. (English.) Hiroshi Fujiwara. *Physical Society of Japan, Journal,* v. 10, no. 5, May 1955, p. 339-346.

A modified, screened Coulomb field is exactly obtained from the Thomas-Fermi equation by numerical integration. For the calculation of the cross section, the method of partial wave was used. Graphs, tables. 7 ref.

11959* Magnetic Properties of FeTe. (English.) Enji Uchida and Hisamoto Kondoh. *Physical Society of Japan, Journal,* v. 10, no. 5, May 1955, p. 357-362.

Susceptibility-temperature relation for the compound FeTe was measured over a range of temperatures between liquid air and 1150 C. Graphs, table. 13 ref.

11960* The Theory of Fatigue Fracture of Metals. (English.) Takeo Yokobori. *Physical Society of Japan, Journal,* v. 10, no. 5, May 1955, p. 368-374.

Fatigue cracks are assumed to form as a result of a large tensile stress caused by a piled-up group of dislocations, plus an externally applied tensile stress component, with the aid of other stress concentration factors associated with the obstacle or inclusion itself. Diagrams, graphs, table. 30 ref.

11961 The Influence of Temperature on Magnetic Viscosity. J. H. Phillips, J. C. Woolley, and R. Street. *Physical Society, Proceedings,* v. 68, no. 426B, June 1955, p. 345-352.

Measurements made to demonstrate the effect of temperature on irreversible magnetic viscosity in different types of precipitation alloys: Pt-Co, Ni_2Au, and Alnico in an undeveloped state. Graphs. 12 ref.

11962* Pressure Pulsation Tests Show Why Branch Connections Fail. A. R. C. Markel, H. H. George, and E. C. Rodabaugh. *Pipe Line Industry,* v. 3, July 1955, p. 32-38.

Probable causes of failure, welding, design, superimposed loadings, test methods, apparatus, procedure, and results are discussed at some length. Tables, diagrams, photographs. 2 ref.

11963* Measurement of Resistance and Reactance of Expanded ACSR. Joel Tompkins, B. L. Jones, and P. D. Tuttle. *Power Apparatus and Systems,* 1955, no. 18, June, p. 368-373; disc., p. 373-375.

Electrical characteristics, reactance and effective resistance at the frequency of 60 c.p.s., of steel reinforced Al cable. Tables, graphs, photographs, diagrams. 5 ref.

11964* Problem of Complex Stressing. **K voprosu o slozhnom nagruzhenii.** (Russian.) L. M. Kachanov. *Prikladnaia Matematika i Mekhanika,* v. 19, no. 3, May-June 1955, p. 371-375.

Theory of elasto-plastic deformations and that of plastic flow; equations for the two theories and their interrelation. 5 ref.

11965 Electron Emission and Other Phenomena on Freshly Disturbed Surfaces. L. Grunberg. *Research,* v. 8, June 1955, p. 210-214.

Measurement of small electron currents from deformed surfaces. Study of abraded surfaces by their images on photographic plates. Diagrams. 13 ref.

11966 Adaptation of Bergsman Microhardness Tester to American Optical Metallograph. E. W. LaRocca. *Review of Scientific Instruments,* v. 26, June 1955, p. 590-591.

Advantages of the combined system are its simplicity, speed, and improved accuracy, as well as the reduction in wear of moving parts. Photograph, diagrams.

11967 The Thermal Conductivity of Tin at Low Temperatures. S. J. Laredo. *Royal Society, Proceedings,* v. 229, ser. A. May 24, 1955, p. 473-492.

The use of subsidiary thermometers has improved the technique of measurement below 1 K and enabled conductivities to be measured more accurately. Diagram, tables, graphs. 31 ref.

11968* Properties of Steel as to Its Behavior in Welded Constructions. **Die Eigenschaften des Eisens im Zusammenhang mit seinem Verhalten in Schweisskonstruktionen.** (German.) E. Houdremont and H. J. Wiester. *Schweissen und Schneiden,* v. 6, special no., 1954, p. 16-23.

Behavior of Fe under mechanical stress; effect of stress distribution, stress velocity, temperature, and structure; economic aspects in the choice of structural steels; weld stresses. Photographs, tables, graphs. 21 ref.

11969* Safety and Quality in Different Types of Welded Construction. **Sicherheit und Güteanforderungen bei den verschiedenen Arten geschweisster Konstruktionen.** (German.) K. Klöppel. *Schweissen und Schneiden,* v. 6, *special no.* 1954, p. 38-65.

Analyses of the causes of weld failures; factors to be considered in the choice of structural steels; effect of treatment of steels and weld joints on strength of welded structure. Photographs, micrographs, tables, diagrams, graphs. 24 ref.

11970* The Behavior of Spherical Graphite in the Plastic Deformation of Ductile Cast Iron. **Ueber das Verhalten der Graphit-Sphäroliten bei der plastischen Verformung des duktilen Gusseisens.** (German.) B. Sigg. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 21, no. 5, May 1955, p. 148-150.

Study of the deformation of spheroid graphite in high Si cast iron subjected to tensile and compression stresses. Micrographs, graph, table.

11971 Precision Measurement of Diamond Indentors for —Rockwell Hardness Testing. F. R. Tolmon and Joyce F. Hall. *Sheet Metal Industries,* v. 32, no. 338, June 1955, p. 447-451.

Developments of methods for the measurement of the cone angle and tip radius of diamond indentors and a brief statement of experience gained in the inspection of indentors during the past few yr. Diagrams, micrographs. 1 ref.

11972 High-Speed Universal Fatigue Testing Machine. Verification of Statically Calibrated Mechanical-Optical Dynamometer. M. Russenberger and G. Földes. *Society for Experimental Stress Analysis, Proceedings,* v. 12, no. 2, 1955, p. 9-20. (TG265 So13p)

Working principles and applications of fatigue testing machine. Use of a statically calibrated mechanical-optical dynamometer as a load indicator for dynamic tests. Photographs, diagrams.

Metals—Mechanical and Physical Properties

11973 An Analysis of Plastic Behavior of Metals With Bonded Birefringent Plastic. J. D'Agostino, D. C. Drucker, C. K. Liu, and C. Mylonas. *Society for Experimental Stress Analysis, Proceedings,* v. 12 no. 2, 1955, p. 115-122. (TG265 So13p)

Sheets of photoelastic material were bonded to metal parts to provide a means of measuring the plastic strains in the surface of the metal. Diagrams, photographs. 6 ref.

11974 Elimination of the Transient Strain Fluctuations Which Result From Longitudinal Impact of Bars. J. M. Krafft. *Society for Experimental Stress Analysis, Proceedings,* v. 12, no. 2, 1955, p. 173-180. (TG265 So13p)

Studies of nature and origin of strain waves; ways to eliminate them in impact and collision testing. Diagrams, graphs, table. 11 ref.

11975* Heat-Resistant Alloys and Their Properties. **Stopy żaroodporne i ich własności.** (Polish.) E. Lachowski. *Technika lotnicza,* v. 10, no. 3, May-June 1955, p. 73-81.

Strength and anti-corrosion properties, required of alloys used in jet aircraft, are given for chrome-nickel steels, and Nimonic and Vitallium alloys. Tables, graphs.

11976 Thermal Conductivity of Metal Composites. E. B. Masters. *U. S. Atomic Energy Commission, APEX*-186, 1954, 4 p. (UF767 Un3.1ap)

Results of tests performed to evaluate the thermal insulating properties of metal composites. Comparison of thermal conductivities of the metal composite tested and "Thermoflex" mineral wool insulation at various temperatures. Graph, diagrams.

11977 Vapor Pressure Curves for C, Ni, Fe, Cr, Mo, W, Cu, Ta, and Al Over the Pressure Range From 10^{-10} Atm to 1 Atm. A. R. Smider. *U. S. Atomic Energy Commission,* CRD-T2B-171, 1952, 12 p. (UF767 Un3.1cr)

Pressure range covered herein is considered to be adequate for all ordinary applications. Tables, graphs.

11978 Tensile Properties of Some Sheet Materials Under Rapid-Heating Conditions. George J. Heimerl and John E. Inge. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* L55E12b, June 1955, 10 p. (TL782 Un3rm)

Materials were tested at temperature rates from 0.2 to 100 F per sec. under constant-load conditions. Graphs. 6 ref.

11979* The Hardness of Metals. Relationship Between Hardness and Tensile Strength. **Die Härte metallischer Werkstoffe. Zusammenhang zwischen Härte und Zugfestigkeit.** (German.) E. Kappler. *VDI Zeitschrift,* v. 97, nos. 15-16, May 15, 1955, p. 479-485.

Mathematics of the elastic and plastic deformations of ball-impression hardness testing; plastic behavior of slightly cold-worked materials; equations of state of plastic deformations from Brinell hardness; tensile correlation of Brinell hardness to tensile test. Graphs, diagram. 5 ref.

11980* The Strength of Metals as an Atomic-Physical Phenomenon. **Die Festigkeit metallischer Werkstoffe als atomphysikalische Erscheinung.** (German.) W. Kossel. *VDI Zeitschrift,* v. 97, no. 17, June 11, 1955, p. 516-518.

Effect of crystal growth and lattice structure on the mechanical properties of metals. Diagrams, photographs. 2 ref.

11981* Nature of Necking During the Tensile Testing of Specimens. **O prirode sheiki pri rastiazhenii obraztsov.** (Russian.) N. N. Davidenkov. *Zhurnal Tekhnicheskoi Fiziki,* v. 25, no. 5, May 1955, p. 877-880.

Necking during tension is viewed as a result, not of the change of the physical nature of the process of plastic deformation, but of the impairment of the mechanical stability of uniform elongation. Graph. 13 ref.

11982* Influence of Molten Metallic Coatings on the Mechanical Properties of Steels and Alloys. **Vliianie rasplavlennykh metallicheskikh pokrytii na mekhanicheskie svoistva stalei i splavov.** (Russian.) Ia. M. Potak and I. M. Shcheglakov. *Zhurnal Tekhnicheskoi Fiziki,* v. 25, no. 5, May 1955, p. 897-907.

Mechanical properties of the alloys determined at the melting temperature of the coating. Comparison of properties of plated and unplated metals at various temperatures. Tables. 4 ref.

11983* Problem of the Nature of the Hardening and Softening of Plastically Deformed Metals. **K voprosu o prirode uprochneniia i razuprochneniia plasticheski deformirovannykh metallov. I.** (Russian.) V. N. Danilov. *Zhurnal Tekhnicheskoi Fiziki,* v. 25, no. 5, May 1955, p. 916-921.

Relationship between hardening and the coefficient of thermoelectromotive force, and lattice distortion. Temperature of recrystallization determined by measuring the thermo-e.m.f. Graphs, table. 19 ref.

11984* Character of the Fracturing of Plastic Metals Under the Conditions of the Concentration of Stresses During Tension. **O kharaktere razrusheniia plastichnykh metallov v usloviiakh** I. Likhachev. *Zhurnal Tekhnicheskoi Fiziki,* v. 25, no. 5, May 1955, p. 922-932.

Notched specimens tested to show relation of load to position of boundary between elastic and plastic zones; local plastic deformations; shear tests; tangential stresses. Diagrams, graphs. 8 ref.

Books and Miscellaneous Publications

11985 Effect of Hydrogen on the Mechnical Properties of Titanium and Titanium Alloys. Summary Report Under Contract no. DA-33-019-ORD-938. G. A. Lenning, C. M. Craighead, and R. I. Jaffee. PB 111568. 83 p. 1953. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

On various high-purity and commercial-purity specimens, H is shown to be an impurity which must be kept under control to obtain maximum advantage. The mechanism of H embrittlement of Ti and α alloys differs from that of α-β alloys.

See also:

11114 (wear of cutting tools)
11120 (rheological properties of building materials)
11607 (wear resistance of steel)
11631 (fatigue of aluminum alloys)
12138 (magnetic properties of metal powders)
12267 (magnetic alloys and ferrites)
12341 (brittle fracture of welded structures)

METALS—MECHANICAL WORKING

11986* A Note on the Calculation of the Cross-Section of the Buffer of a Bloom Shears. (English.) L. Gascuel. *Acier, Stahl, Steel,* v. 20, no. 4, Apr. 1955, p. 171-172.

Includes diagrams, photograph.

11987 Controlled Stretch-Forming. *Aircraft Production,* v. 17, June 1955, p. 234-236.

A method of producing consistent workpieces by means of a servo-control system. Diagrams, photograph.

11988 Turret Machining. *Aircraft Production,* v. 17, June 1955, p. 237-241.

Discusses methods of sequence control, operational control, turret control, and screw cutting. Photographs, diagrams.

11989 Radial Draw-Forming. *Aircraft Production,* v. 17, July 1955, p. 255-261.

Compression-control of material during the forming process; cold forming of Ti-alloys. Description of equipment and operating procedures. Photographs, diagrams.

11990 Control Data. R. H. Booth. *Aircraft Production,* v. 17, July 1955, p. 262-267.

Function of the electronic computer in machine-tool and production-process control. Diagrams, circuit diagrams, graph, photographs.

11991 Machining Titanium. II. Investigations Into the Effects of Coolant and Hardening Properties When Machining Ti 150A. J. T. D. Holt and J. Purcell. *Aircraft Production,* v. 17, July 1955, p. 279-281.

Tool life; cutting fluids; inflamability of swarf. Photographs, graphs, table, diagrams.

11992 Hydraulic Spinning. *Aircraft Production*, v. 17, July 1955, p. 282-286.

Details of forming process for the production of tubular and conical parts and rings of profiled cross-section. Photographs, diagrams.

11993 Tangential Stretch-Forming. *Aircraft Production*, v. 17, July 1955, p. 290-292.

Details of the Müller press counter-drawing attachment for local re-drawing operations. Photographs, diagram.

11994* The Machining of Light Metals by Cutting. **Die spanabhebende Bearbeitung der Leichtmetalle.** (German and French.) Jean-Jacques Desherault. *Aluminium Suisse*, v. 5, no. 3, May 1955, p. 76-92.

Effect of shape and properties of materials, machines, cutting tools, cutting conditions, and lubrication on machinability; classification of light metals; description of different types of machining operations. Diagrams, graphs, photographs, tables.

11995* Machining Light Metals With Hard-Metal Cutting Tools. **Spanabhebende Bearbeitung von Leichtmetall mit Hartmetall-Werkzeugen.** (German and French.) E. and P. Frey. *Aluminium Suisse*, v. 5, no. 3, May 1955, p. 93-96.

Proper conditions for lathing, milling, and reaming. Tables, photographs, diagram.

11996 Powder-Metal Cutters Promise New Milling Economy. Horace Frommelt. *American Machinist*, v. 99, June 6, 1955, p. 128-129.

Disposable milling cutters sintered with thin carbide blades in place may cost less than regrinding, provide longer tool life, and faster cutting. Photographs, diagrams.

11997 Cope Talks on Draw Dies. XXIX. Apply Correct Clearances and Speed When Drawing Stainless. Stanley R. Cope. *American Machinist*, v. 99, June 6, 1955, p. 130-133.

Shaving, bending and forming dies, lubricants, cemented-carbide die parts, and press speeds are discussed. Diagrams, tables.

11998 What Is the Best Screw-Machine Stock? Richard F. Harvey. *American Machinist*, v. 99, June 20, 1955, p. 113-115.

Results of extensive production tests on the machinability of C1119 steel. Photographs, tables, diagram, micrographs.

11999 What Size Nose Radius? Robert E. Nixon. *American Machinist*, v. 99, June 20, 1955, p. 138-139.

Description of how the nose radius is constructed, what it does in the operation of the tool, and how to determine what size radius should be used for different conditions and materials. Diagrams, graphs.

12000 Toxic Materials Machined Safely. Donald P. O'Neil. *American Machinist*, v. 99, July 4, 1955, p. 125-129.

Design of hoods, allowable concentrations in the air, and operating rules that should be followed when machining Be. Diagrams, photographs, tables.

12001* Position of the Neutral Angle in Hot and Cold Rolling Processes. **Kąt płaszczyzny podziałowej w procesie walcowania na gorąco i na zimno.** (Polish.) Zygmunt Wusatowski. *Archiwun Górnictwa i Hutnictwa*, v. 3, no. 1, 1955, p. 11-42.

Analysis, verification, and amplification of various formulas for the neutral angle; equations for homogeneous compression and slipping friction along contacting arc. Formulas recommended for cold rolling without tension and for hot rolling without spreading. Tables, graphs. 16 ref.

12002 The Grinding of Titanium Alloys. C. T. Yang and M. C. Shaw. *ASME, Transactions*, v. 77, July 1955, p. 645-660.

A study of the influence of a wide variety of operating and grinding-wheel variables reveals the most important quantities to be grinding-wheel speed, type of abrasive, and grinding fluid. Table, graphs, diagrams, micrographs, photographs.

12003 Best Reel Performance Is Obtained When Current Regulator Operates on the Generator. A. J. Winchester. *Blast Furnace and Steel Plant*, v. 43, June 1955, p. 647-649.

Discussion of winding reel control on hot and cold mills in the metal working industry. Diagrams, graphs, photograph.

12004 Measurement of Temperature in the Drawing of Bar and Wire Stock and the Problem of Supercritical Drawing Speeds. W. Reichel. *Henry Brutcher Translation No.* 2670, 17 p. (From *Stahl und Eisen*, v. 70, no. 25, 1950, p. 1141-1146.) Henry Brutcher, Altadena, Calif.

Temperature conditions in the drawing of bar and wire stock at supercritical speeds, where the temperature in the drawing tool falls off. Conclusions drawn from observations in machining operations. Graphs, diagrams, photographs. 18 ref.

12005 Electrospark Marking of Hardened Tools. F. F. Cherepanov. *Henry Brutcher Translation No.* 3479, 4 p. (Condensed from *Stanki i Instrument*, v. 25, no. 5, 1954, p. 29-30.) Henry Brutcher, Altadena, Calif.

Development of a method for the marking of mass-produced tools which has proved superior to all other methods. Table, photographs.

12006 Machining of Holes by the Electrospark Process. V. E. Dumpe. *Henry Brutcher Translation No.* 3496, 8 p. (Abridged from *Vestnik Mashinostroeniya*, v. 34, no. 12, 1954, p. 51-55.) Henry Brutcher, Altadena, Calif.

Study of electrospark machining of holes in steel for rate of metal removal, dimensional accuracy and surface roughness of the holes machined, using a large and small electrospark unit. Graphs, photographs, table. 1 ref.

12007 New Process of Production of Metal-Powder Tools for the Electrospark Machining of Metal Parts. E. A. Volodin and L. A. Kovsharova. *Henry Brutcher Translation No.* 3497, 5 p. (From *Vestnik Mashinostroeniya*, v. 34, no. 12, 1954, p. 56-57.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 7114, v. 4, May 1955.

12008 Influence of Lubricants Upon the Surface Flow of Metal. S. Ya. Veiler. *Henry Brutcher Translation No.* 3519, 6 p. (From *Doklady Akademii Nauk SSSR*, v. 99, no. 6, 1954, p. 1025-1027.) Henry Brutcher, Altadena, Calif.

Study of influence of different lubricants upon tangential force, micro-structure, and micro-hardness through flow in surface zone. Photographs, tables. 4 ref.

12009 Helical Carbide Cutters. *Canadian Metals*, v. 18, June 1955, p. 47, 50, 52.

Problems in the manufacturing and use of the cutters are; correct type of steel for cutter body, economies of tipping, brazing difficulties, and grinding techniques. Photographs, diagrams.

12010 Computer Techniques Extended to Machine Tool Control. *Electrical Manufacturing*, v. 55, June 1955, p. 124-132, 330, 332.

New director control systems using static devices and switches without electrical contacts. Examples of extension of automaticity to sequencing controls. Photographs, graph, diagrams.

12011 The Metallurgical Control of High-Quality Aluminium Forgings. T. E. Murch. *Engineers' Digest*, v. 16, May 1955, p. 237-238, 243.

Outlines some of the methods whereby the light-alloy forging industry endeavors to ensure that the requirements of the aircraft industry are maintained. Photographs.

12012 Residual Stresses in Heavy-Wall Cylinders. J. H. Faupel. *Franklin Institute, Journal*, v. 259, May 1955, p. 405-419.

Residual stress resulting from the autofrettage of steel cylinders appears to be related to the hardness or structure of the steel employed. Tables, graphs, diagram. 3 ref.

12013 Sixty-Cycle Induction Heating of Large Steel Sections for Hot Forming. IV. C. H. Hartwig. *Industrial Heating*, v. 22, May 1955, p. 952, 954, 956, 958.

Effects of larger air gap and increased power input on temperature, power, and current curves are discussed. Table, diagrams. (To be continued.)

Metals—Mechanical Working

12014 Successful Modernization of Soaking Pits. H. W. Hodges. *Industrial Heating*, v. 22, May 1955, p. 983-984, 986.

Improvements made and benefits derived. Photographs.

12015 Sixty-Cycle Induction Heating of Large Steel Sections for Hot Forming. V. C. H. Hartwig. *Industrial Heating*, v. 22, June 1955, p. 1160, 1162, 1164, 1166.

Equipment and accessories for heating ingots to forging temperatures. Diagrams.

12016 Manufacture and Properties of Large Forgings. Adolph O. Schaefer. *Industrial Heating*, v. 22, June 1955, p. 1168 + 10 pages.

Composition of forging alloys; applications; production problems. Tables, photographs, diagrams. (To be continued.)

12017 Die Design Solves Small Part Production Problems. Federico Strasser. *Iron Age*, v. 175, June 9, 1955, p. 78-80.

Design of punch for small parts, made from thin stock and with closely spaced holes, result in better production at lower costs. Diagrams.

12018 New Merchant Bar Mill Equipped for Maximum Versatility. R. A. Peterson. *Iron Age*, v. 175, June 9, 1955, p. 85-87.

Mill consists of a reheating furnace, a primary three-high breakdown mill, an intermediate mill unit of four two-high stands, and a finishing mill unit with two, two-high stands in staggered arrangement. Photographs.

12019 Dies Travel With Strip in New High-Speed Press. E. C. Beaudet. *Iron Age*, v. 175, June 16, 1955, p. 83-85.

Press design incorporates dies which move with the strip and continuous coil feeding. Advantages include less setup time, variable feed lengths, and low maintenance. Photographs.

12020 Machine Tools—1855 to 1955. *Iron Age (100th Anniversary Issue)*, v. 175, June 1955, p. 2E-20E.

Development and prospects of machine tools and their accessories. Photographs.

12021 Presswork—1855 to 1955. *Iron Age (100 Anniversary Issue)*, v. 75, June 1955, p. 2I-16I.

Review of progress in hot and cold pressing and forging. Photographs.

12022 Rolling of Shapes in Alloy and Tool Steel Grades. Ernest E. Davis and A. H. Highley. *Iron and Steel Engineer*, v. 32, June 1955, p. 59-64; disc., p. 64-66.

Pass designs for a given alloy and a given section. Rolling details. Typical sections. Diagrams, photograph.

12023 Operation of Magnetic Amplifier Controlled Tandem Mills. J. C. Peth and J. W. Brinks. *Iron and Steel Engineer*, v. 32, June 1955, p. 69-76; disc., p. 76-77.

Advantages of magnetic amplifiers over rotating types. Components, operation, and maintenance of magnetic amplifiers. Photographs, diagrams, graphs, table.

12024 Practical Aspects of the Cold-Rolling of Narrow Steel Strip. T. W. Hood. *Iron and Steel Institute, Journal*, v. 180, June 1955, p. 189-200 + 2 plates.

Practices in the cold-rolling of narrow strip in mild, high-carbon, and stainless steels. Hydraulically loaded mills are specially mentioned, with practical problems such as coolant, rolls, roll grinding, roll-neck bearings, etc. Table, diagrams. 9 ref.

12025 Effect of Certain Primary Mill Heating and Rolling Practices on Slab Surface Quality. H. B. Wishart and C. A. Hope. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, July 1955, p. 811-812.

Discussion of three factors of processing variables; amount of reduction between ingot and slab, slab finishing temperatures, and influence of roll changes. Photographs, graphs.

12026* Calculation of the Curving of Rolls. **Hengerek domborításának számítása.** (Hungarian.) Elemér Köves. *Kohászati Lapok*, v. 10, no. 5, May 1955, p. 222-226.

Calculation examples made with duraluminum ingots during hot rolling, taking into consideration the rolling pressure and heat expansion of the rolls. Diagrams, graphs, tables. 21 ref.

12027* Sliding Friction Test for Metalworking Lubricants. W. J. Wojtowicz. *Lubrication Engineering*, v. 11, May-June 1955, p. 174-177.

Outlined procedure gives pertinent information regarding the ability of a lubricant to decrease friction and to inhibit metallic welding during deep drawing. Experimental data confirms practical experience and indicates that there exists a specificity between lubricants and metals. Tables, graph, diagram. 14 ref.

12028* Maintenance of Water-Soluble Machining Coolants During Use. J. A. Prevel. *Lubrication Engineering*, v. 11, May-June 1955, p. 178-179.

Physical and chemical methods of control which extend the life of the coolants.

12029 "Chem-Mill" on a Production Basis at North American. Manuel Sanz. *Machinery*, v. 61, June 1955, p. 156-163.

Application of the etching process which enables the convenient reduction of sections on metal parts after forming or forging without any change in important dimensions. Photographs.

12030 Precision Forging of Jet-Engine Blades. Edward B. Wells. *Machinery*, v. 61, June 1955, p. 192-199.

Vacuum melting of heat-resistant alloys, electrical resistance upsetting of billets, induction and high-speed gas heating, and impacting are some of the latest developments employed in the production of compressor blades and turbine buckets for jet engines. Photographs.

12031 Northrop Missiles Made to Optical Accuracy. *Machinery*, v. 61, June 1955, p. 206-209.

Specially designed machines and optical equipment are employed to maintain parallelism of milled surfaces to 0.0002-in. within a 10-in. span, angular location to 1-sec. of arc, and similar extremely close tolerances in producing parts for the Snark missile. Photographs.

12032 Ultrasonic Machine Cuts Precision Holes in Hydraulic Sleeves. William W. Wood. *Machinery*, v. 61, June 1955, p. 220-221.

Method involves the use of a H.F., alternating electrical current which can be made to oscillate a tool the size of the desired orifice 30,000 times a sec. Photographs.

12033 Metal Machining. IV. Work Materials and Tool Materials. (English and Spanish.) W. Alfred Carter. *Machinery Lloyd (Overseas Ed.)*, v. 27, May 21, 1955, p. 69-73, 75-77.

Effect of structure of work pieces on the type of tool material used. Photograph, diagram, micrograph.

12034* Application and Grade Selection of Tungsten Carbide Tooling. Edward J. Novack. *Machine and Tool Blue Book*, v. 50, June 1955, p. 157-162.

Discusses three groups of W carbides for machining purposes: including the edge wear resistant grades for cutting plastics, cast iron, bronze, Al, and other non-ferrous and abrasive materials the crater resistant types and the intermediate group having more or less balanced compositions. Table, diagrams.

12035* High Feed Rate Milling Made Practical With Solid Carbide Blades. R. C. Legge. *Machine and Tool Blue Book*, v. 50, June 1955, p. 168-170. 172.

Discusses trend toward heavy solid carbide mechanically held inserts in single- and multiple-point cutting tools, and describes their advantages.

12036* Press Tool Detail Design for Optimum Productivity. *Mechanical World and Engineering Record*, v. 135, June 1955, p. 252-255.

Details are discussed which were found of practical benefit to the toolmaker and press setter and therefore to the economic operation of the plant. Tables, diagrams.

12037* Deep-Drawing Investigation by the Metal Institute. T.N.O. **Dieptrekonderzoek van het Metaalinstituut T.N.O.** (Dutch.) J. H. Zaat. *Metalen*, v. 10, no. 9, May 15, 1955, p. 117-121.

Testing methods for sheet metals are reviewed and a testing method designed by the institute, is discussed more extensively. Diagrams. 1 ref.

12038 Extrusion of Aluminium. I. G. Slater. *Metal Industry*, v. 86, June 3, 1955, p. 464-468.

Extrusion presses, extrusion dies, furnaces, impact extrusion, and future outlook. Table, photographs.

12039 Rolling Aluminium. R. T. Staples. *Metal Industry*, v. 86, June 3, 1955, p. 468-471.

Survey of the scope of sheet rolling in the Al industry. Graph, tables, photograph.

12040 Aluminium Forgings. E. W. Peel. *Metal Industry*, v. 86, June 3, 1955, p. 472-475.

Use in aircraft design and other industries where there is a demand for the high strength, ductility, soundness, dimensional accuracy, and all the other qualities of the light alloy die forgings. Photographs.

12041* Several Methods of Economical Belt Grinding. **Einige Wege zum wirtschaftlichen Bandschleifen.** (German.) G. Pahlitzsch and H. Windisch. *Metall*, v. 9, nos. 11-12, June 1955, p. 496-499.

Effect of smooth and grooved supporting disks on grinding efficiency. Photograph, graph, table. 4 ref. (To be continued.)

12042* Electronic Control Makes Boring Mill Automatic. *Metalworking Production*, v. 99, May 20, 1955, p. 910-912.

Integral electronic copying equipment enables flywheels to be profile turned in an automatic cycle. Photographs, diagram.

12043* What Happens When Speeds Are Increased? R. Tourret. *Metalworking Production*, v. 99, May 27, 1955, p. 930-932.

A review of data published on the effect of increased cutting speeds. Graphs. 22 ref.

12044* Solve Special Shell Problems With Proved Die Design Methods. XXVI. Stanley R. Cope. *Metalworking Production*, v. 99, June 17, 1955, p. 1102-1105.

Design of drawing dies for forming a shell with corrugations, two levels, or pockets. Diagrams.

12045* Contribution to the Study of the Stamping of Metals. **Contribution à l'étude du poinçonnage des métaux.** (French.) Lucien Godtschalck. *Métaux, Corrosion-Industries*, v. 30, no. 354, Feb. 1955, p. 47-77.

Mechanical characteristics of stamping are determined by observing metal deformations and by analysis of tension and stamping diagrams. Micrographs, tables, diagrams, graphs, photographs. (To be continued.)

12046* A Study of the Punching of Metals. **Contribution à l'étude du poinçonnage des métaux.** (French.) Lucien Godtschalck. *Métaux, Corrosion-Industries*, v. 30, no. 355, Mar. 1955, p. 110-133.

Details of tests on influence of the nature and surface state of the punched metal, and on heterogeneity of soft open-hearth steel. Tables, graphs. (To be continued.)

12047* Contribution to the Study of the Stamping Metals. **Contribution à l'étude du poinçonnage des métaux.** (French.) Lucien Godtschalck. *Metaux, Corrosion-Industries*, v. 30, no. 356, Apr. 1955, p. 155-172.

Influence of play between punch and die, stamping rate, metal thickness, and die lubrication. Diagrams, tables, graphs, photograph. 18 ref.

12048* Contribution to the Theory of Frictional Wear of Turning Tools. E. Bickel. *Microtecnic (English Ed.)*, v. 9, no. 2, 1955, p. 53-57; disc., p. 58.

Four phenomena of cutting edge failure considered according to cause and effect. Graphs.

12049* Low Temperature, Cooling, A Means of Increasing Cutting Tool Life. G. Pahlitzsch. *Microtecnic (English Ed.)*, v. 9, no. 2, 1955, p. 65-69.

Tests indicated a 42% extension of tool life and an increased savings in manufacturing and tool costs. Graphs, photograph.

12050* New Method for Evaluating Coolant Efficiency. F. Eugène. *Microtecnic (English Ed.)*, v. 9, no. 2, 1955, p. 70-80.

Evaluation of coolant effect in machining operations may be satisfactorily made through measurement of specific tool abrasion. Diagrams, tables, photographs, graphs. 4 ref.

12051 Using Punched-Card Equipment for Automatic Machine Tool Control. Alan H. Stillman. *Product Engineering*, v. 26, June 1955, p. 172-176.

Description of computers and converters. Calculations for noncircular gears produced by automatic gear-cutting control. Photographs, diagrams. 2 ref.

12052* High-Speed Machining and Cutting With Kolesow-Type Machine Tools. **Skrawanie szybkościowe i skrawanie narzędziami typu Kolesowa.** (Polish.) Jan Kaczmarek. *Przegląd Techniczny*, v. 75, no. 3, Mar. 1954, p. 94-98.

Calculation of factors in cutter angle, depth and rapidity of feed, opposition to cutting, materials being machined, heat generated, machining time, and forces. Graphs, diagrams, photograph. 8 ref.

12053* New Rail-Grinder Train—Takes Off the Rough Spots. *Railway Track and Structures*, v. 51, June 1955, p. 30-33.

As train moves along at about 2 m.p.h., 96 power-driven abrasive wheels, mounted on special truck assemblies beneath cars, grind out corrugations and other surface irregularities on both rails simultaneously. Photographs.

12054* Oxy-Propane Flame Cutting. **Brennschneiden mit Propan.** (German.) G. Oldenburg. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 124-128.

Chemical properties of various liquified gases; comparison of O consumption, heat evolution, and combustion rate of acetylene and propane; effect of cutting angle on cutting rate; advantages of cutting with propane. Graphs, diagrams, tables.

12055* Automatic Turret Lathe Control. Leonard Hesse. *Screw Machine Engineering*, v. 16, June 1955, p. 40-41.

Turret lathe part produced by magnetic tape control of the machine tool with automatic compensation for tool adjustment. Photographs, diagram.

12056 The Fundamentals of Progressive Tooling. J. A. Grainger. *Sheet Metal Industries*, v. 32, no. 338, June 1955, p. 405-409, 452.

Deals with basic fundamentals, types, relief of the strip on follow-on tools, consideration of the no. of stages in a tool, the scope of progressive tooling, and die construction. Photographs, diagrams. (To be continued.)

12057 A Combination Die for the Simultaneous Production of Sharp Bends and Pierced Holes. W. M. Halliday. *Sheet Metal Industries*, v. 32, no. 338, June 1955, p. 453-457.

Design and construction of bending dies for the production of bent parts in strip or small diameter wire stock. Diagrams.

12058 The Rolling of Metals and Alloys. V. A Practical Method of Calculating Rolling Loads and the Establishment of Rational Rolling Schedules. E. C. Larke. *Sheet Metal Industries*, v. 32, no. 338, June 1955, p. 459-464.

A description of the use of a practical method of calculating rolling loads, and a demonstration by examples of its application to the analysis and design of rolling schedules when no coiler or decoiler tension is employed. Graphs, tables. 8 ref.

12059* The New Blooming Mill of the Böhler & Co., AG, at Kapfenberg. **Des neue Blockwalzwerk der Böhlerwerke in Kapfenberg.** (German.) Guido Bersa and Stefan Glavitza. *Stahl und Eisen*, v. 75, no. 10, May 19, 1955, p. 624-629.

Description of the blooming mill, breaking down mill, auxiliary plants, furnaces, and electrical equipment. Lubricating, descaling, operation of the mills, and operational results. Photographs, diagrams. 2 ref.

12060* Swedish Intermediate, Small Section and Wire Rolling Mills of Novel Design. **Neuartige schwedische Mittelstahl-, Feinstahl- und Drahtwalzwerke.** (German.) Erik M. Norlindh. *Stahl und Eisen*, v. 75, no. 11, June 2, 1955, p. 700-709.

Metals—Mechanical Working

Design of a multiple-purpose mill train for medium and fine steel sections as well as for wire rod. Describes roller guides, repeaters, looping channels, grease bath couplings, three-high and interchangeable two-high housing chucks, and chucks for vertical rolls. Diagrams, photographs. 2 ref.

12061* Effect of Increased Requirements as to Output and Quality on the Design, Operation, and Control of Rolling Mill and Forge Furnaces. **Einfluss gesteigerter Leistungs- und Güteansprüche auf bauliche Gestaltung, Betrieb und Überwachung von Walzwerks- und Schmiedeöfen.** (German.) Berthold von Sothen. *Stahl und Eisen*, v. 75, no. 11, June 2, 1955, p. 709-718.

Causes, kinds and extent of the requirements to be met by heating, annealing and heat-treating furnaces. Correlations between furnace capacity, heat absorbing power, heat transmission and products to be heated. The process of heating: heating time, temperature-time curves of heating, through-heating, loss by burning, skin decarburization, condition of scale, and features of development of the design. Diagrams, photographs. 15 ref.

12062* The Aptitude of Different Emulsions to the Cold Rolling of Steel Strip. **Die Brauchbarkeit verschiedener Emulsionen beim Kaltwalzen von Bandstahl.** (German.) Hans Pannek. *Stahl und Eisen*, v. 75, no. 12, June 16, 1955, p. 767-769.

Characteristics, execution, and results of tests and conclusions drawn from the operation. Tables.

12063* Recent Investigations on the Drawing and Extrusion of Steel Bars. **Neue Untersuchungen über das Ziehen und Einstossen von Stabstahl. II.** (German.) Werner Lueg and Karl-Heinz Treptow. *Stahl und Eisen*, v. 75, no. 12, June 16, 1955, p. 769-776.

Considerations on the effect of working conditions on deformation. Effect of the bearing length on the power required in drawing and on the swelling under different conditions of working.

12064 How to Buy Cutting Fluids. John A. Boyd. *Steel*, v. 136, June 6, 1955, p. 80-82.

Factors to be considered in buying and testing cutting fluids. Photographs, graphs, table.

12065 Save on Snagging. John A. Mueller. *Steel*, v. 136, June 20, 1955, p. 110-112.

The effect on production rate, power consumption, and wheel performance as determined by reduced wheel diameter, pressure on the wheel, and open and dense structure of snagging wheels. Photographs, graphs, table.

12066 Spin Drawing Rolls Away Costs. William E. Dean. *Steel*, v. 136, June 27, 1955, p. 84-86.

It is possible for one machine to produce the same deep drawn parts normally required of a line of presses; equipment investment is less, costly dies are eliminated. Photographs.

12067 Press Plant Specially Built for Large Aircraft Forgings. *Steel Processing*, v. 41, June 1955, p. 349-360.

Description of equipment and operating procedures of Aluminum Corporation of America's 35,000 and 50,000 ton forging presses. Photographs, diagrams, table.

12068 Upset Forgings. Modern Methods and Design. II. M. W. Lamprecht. *Steel Processing*, v. 41, June 1955, p. 367-374, 390-391.

Forging of tubing and gear blanks. Unusual multiple operation forging. Diagrams.

12069 Ultrasonic Impact Grinding. Ralph Moschella. *Steel Processing*, v. 41, June 1955, p. 378-381, 399.

Principles; equipment; methods; applications. Diagrams, photographs.

12070* New Trend in Carbide Tooling. A. S. Rogers. *Tooling and Production*, v. 21, June 1955, p. 77-80.

Analysis of the features, advantages, and limitations of the new tools. Photographs.

12071* Production Machining of Tools and Dies by Electrical Discharge. Richard Stoke. *Tooling and Production*, v. 21, July 1955, p. 51-53.

Drilling, grinding, tapping, boring, and shaping the higher alloyed metals, metals of greater hardness and density, are now being done by electrical discharge machining within any desired tolerance. Tables, photographs.

12072* Machinability Testing of High-Phosphorus Gray Iron. Edward A. Loria. *Western Machinery and Steel World*, v. 46, June 1955, p. 76-81.

Tests comprise tool-wear turning tests on individually cast rings, constant-pressure turning tests on arbitration bars, drill penetration tests on small rectangular bars, and tapping energy tests on very small lock-nut castings. Photographs, graphs, tables, micrographs. 7 ref.

12073* Aluminum Cold Forgings. R. A. Quadt. *Western Machinery and Steel World*, v. 46, June 1955, p. 82-84.

Value in industry for high production, design simplification, and cost reduction. Table, photographs.

12074* Plastic Tooling Standards Needed as Industry Applications Widen. George C. Adams. *Western Metals*, v. 13, June 1955, p. 49-51.

Properties and applications of plastics for metalworking dies and molds. Photographs.

12075* Modern Methods of Rolling Rods Into Rivets and Bolts. **Nowoczesne metody walcowania prętów na nity i śruby.** (Polish.) Roman Wusatowski. *Wiadomości Hutnicze*, v. 11, no. 1, Jan. 1955, p. 4-14.

New and older rolling machines and techniques compared; machine designs, roll types, and groove designing; roller pressures; heating methods; thread rolling. Photographs, diagrams. 11 ref.

See also:

12304 (plastics for press tools)
12305 (development of plastic tools)
12399 (arc cutting of metals)

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

12076 The Crystal Structures of RhTe and RhTe$_2$. S. Geller. *American Chemical Society, Journal*, v. 77, May 5, 1955, p. 2641-2644.

Structures determined from X-ray powder diffraction data. Tables. 11 ref.

12077* Investigation of the Tendency of Soft Unalloyed Steels to Age by Hardness Testing at Temperatures Up to 300 C. **Untersuchung der Alterungsneigung von weichen unlegierten Stählen durch Prüfung der Härte bei Temperaturen bis 300°.** (German.) Eduard Houdremont, Wolfgang Wepner, and Hans- Joachim Wiester. *Archiv für das Eisenhüttenwesen*, v. 26, no. 5, May 1955, p. 279-285.

Effect of aging temperature, type of steel, N and C content, insoluble nitrides, hot working, and heat treatment on the susceptibility of steel to age hardening. Diagrams, tables, graphs. 4 ref.

12078* Microscopic Evidence of Carbide From Supersaturated Alpha Irons. **Mikroskopischer Nachweis von Karbidausscheidungen aus übersättigtem Alpha-Eisen.** (German.) Hugo Josef Seemann and Ursula Hintzpeter. *Archiv für das Eisenhüttenwesen*, v. 26, no. 5, May 1955, p. 287-289.

Effect of artificial aging time on the structures and hardnesses of two irons with 0.02 and 0.13% C content. Graph, micrographs. 7 ref.

12079* Effect of Elastic Stresses on Martensite Formation. **Einfluss elastischer Beanspruchungen auf die Martensitbildung.** (German.) Albert Kochendörfer and Hans-Günter Müller. *Archiv für das Eisenhüttenwesen*, v. 26, no. 5, May 1955, p. 291-298.

Preparation of monocrystals of Fe-Ni steel; effect of quenching and elastic tensile and shear stresses on martensite orientation. Diagrams, micrographs, photographs. 21 ref.

12080* Atomistic Considerations of the Effect of Alloying Elements on the Polymorphism of Iron. **Atomistische Betrachtungen über den Einfluss von Zusatzelementen auf den Polymorphismus des Eisens.** (German.) Konrad Schubert. *Archiv für das Eisenhüttenwesen*, v. 26, no. 5, May 1955, p. 299-305; disc., p. 305-306.

Effect of alloying element on the transformation of Fe and on the stability of the structures of martensitic iron alloys is explained by position of the element in the periodic system and its outer-shell configuration. Table, graphs, diagrams. 36 ref.

12081* Iron-Cobalt-Vanadium Ternary System. **Das Dreistoffsystem Eisen-Kobalt-Vanadin. I.** Formation of the Ternary System in Case of Inhibited Alpha/Gamma Transformation. **Ausbildung des Dreistoffsystems bei gehemmter Alpha/Gamma-Umwandlung.** (German.) Werner Köster and Heinz Schmid. *Archiv für das Eisenhüttenwesen*, v. 26, no. 6, June 1955, p. 345-353.

Thermal, dilatometric, magnetic, microscopic, and X-ray investigations for determination of constitutional diagram. Diagrams, graphs, micrographs. 26 ref.

12082* Influence of External Stress on the Formation of Martensite. **Einfluss äusserer Spannungen auf die Martensitbildung.** (German.) Werner Schmiedel and Heinrich Lange. *Archiv für das Eisenhüttenwesen*, v. 26, no. 6, June 1955, p. 359-363.

Influence of different stresses and deformation on martensite formation in 18/8 steel; interpretation of obtained results. Graphs.

12083* The Effects of Oxygen and Nitrogen in Solid Iron and Steel. L. C. Bogan. *Australasian Engineer*, 1955, Apr., p. 59-65.

Nitrogen activity in α- and γ- iron aids in understanding phenomena associated with plastic flow; in steels, O provides information on the effects of non-metallic inclusions. The solid-solution effects of both gases can be effectively suppressed by Al, Ti, or Zr, fixing them as compounds which have a low solubility in α-iron. Micrographs, tables, graphs. 22 ref.

12084* The Distribution of Dislocations in Linear Arrays. A. K. Head and N. Louat. *Australian Journal of Physics*, v. 8, Mar. 1955, p. 1-7.

An approximate method is given for finding the equilibrium distribution of arrays of dislocations. The analysis is based on the assumption that an array of discrete dislocations may be replaced by a continuous distribution of smeared dislocation.

12085 Accelerated Graphitization of White Cast Iron With Increased Chromium Content. M. A. Krishtal. *Henry Brutcher Translation No.* 3446, 4 p. (From *Doklady Akademii Nauk SSSR*, v. 98, no. 4, 1954, p. 583-584.) Henry Brutcher Altadena, Calif.

Previously abstracted from original. See item 2786, v. 4, Feb. 1955.

12086 Nature of Hexagonal Chromium and the Structure of Electrodeposited Chromium. S. A. Memnonov. *Henry Brutcher Translation No.* 3493, 13 p. (Abridged from *Zhurnal Tekhnicheskoi Fizik*, v. 18, no. 2, 1948, p. 239-246.) Henry Brutcher, Altadena, Calif.

Stages of formation of cubic Cr under ordinary conditions of deposition; effect of temperature and current density. 26 ref.

12087 Effect of Cyclic Stressing Upon Diffusion in Plain Carbon Steels. H. Schenck and E. Schmidtmann. *Henry Brutcher Translation No.* 3500, 9 p. (Part from *Archiv für das Eisenhüttenwesen*, v. 25, nos. 11-12, 1954, p. 579-583.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 5736, v. 4, Apr. 1955.

12088 Some Fundamental Considerations Regarding the Transformations of Austenite in the Pearlite and Bainite Ranges. W. Jellinghaus and E. Houdremont. *Henry Brutcher Translation No.* 3510, 23 p. (Abridged from *Stahl und Eisen*, v. 25, nos. 5-6, 1954, p. 263-270.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 14741, v. 3, Oct. 1954.

12089 Diffusion of Arsenic in Steel. D. S. Kazarnovskii. *Henry Brutcher Translation No.* 3518, 5 p. (From *Doklady Akademii Nauk SSSR*, v. 100, no. 6, 1955, p. 1073-1075.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 9540, v. 4, July 1955.

12090 The Topography of Solid-Liquid Interfaces of Metal Crystals Growing From the Melt. C. Elbaum and B. Chalmers. *Canadian Journal of Physics*, v. 33, May 1955, p. 196-208.

Technique developed for separating, during crystal growth, the liquid from the adjacent solid. Diagrams, micrographs. 6 ref.

12091 X-Ray Diffraction and Spectrographic Analysis. Ursula M. Martius. *Canadian Metals*, v. 18, June 1955, p. 22, 24, 26.

Discussion of the principle features of X-ray diffraction and spectroscopy, and with the practical problems which may be solved by means of these techniques. Photograph, graph.

12092 Metallurgy and Microradiography. I. Theory. II. Experimental. R. Urlocker, J. W. Rutter, and W. C. Wingard. *Canadian Metals*, v. 18, June 1955, p. 28, 30, 32; July 1955, p. 20-21, 23.

Microradiography supplements the investigation of procedures of microporosity; presence and identification of inclusions; distribution, shape and particle size of a second phase; and concentration gradients which may exist in certain regions. Diagram; photograph, micrographs. 5 ref.

12093* Study of Diffusion Throughout the Grain and Along Grain Boundaries, Using the Method of Autoradiography. **Izuchenie diffuzii v ob'eme i po granitsam zeren metalla metodom avtoradiografii.** (Russian.) S. Z. Bokshtein, S. T. Kishkin, L. M. Moroz, and T. I. Gudkova. *Doklady Akademii Nauk SSSR*, v. 102, no. 1, May 1, 1955, p. 73-75 + 1 plate.

Relation of density of darkening to depth of Pb diffusion in Ni and Fe; comparison of rate of diffusion in crystals and along boundaries; difference in mutual solubility of the metals. X-rays, graphs. 8 ref.

12094* Effect of Treatment on Bond Strengths in Crystals of an α-Solid Solution of an Iron-Nickel Alloy. **O vliianii obrabotki na sily sviazi v kristallakh α-tverdogo rastvora zhelezo-nikelevogo splava.** (Russian.) V. K. Kritskaia, G. V. Kurdiumov, and L. V. Tikhonov. *Doklady Akademii Nauk SSSR*, v. 102, no. 2, May 11, 1955, p. 271-274.

Effect of heat treatment (quenching and tempering) and of plastic deformation; X-ray study of filings; character of distribution and redistribution of atoms, and bond strength in the lattices. Graph, table. 14 ref.

12095* Determination of the Coefficients of Diffusion on the Basis of the β-Radiation Absorption. **Opredelenie koeffitsientov diffuzii na osnove absorbtsii β-izlucheniia.** (Russian.) A. A. Zhukhovitskii and V. A. Geodakian. *Doklady Akademii Nauk SSSR*, v. 102, no. 2, May 11, 1955, p. 301-304.

Includes graphs. 6 ref.

12096* Effect of Preliminary Overheating of Steel on the Kinetics of Decomposition of Supercooled Austenite. **Vliianie predvaritel'nogo peregreva stali na kinetiku raspada pereokhlazhdennogo austenita.** (Russian.) V. D. Sadovskii. *Doklady Akademii Nauk SSSR*, v. 102, no. 3, May 21, 1955, p. 515-517 + 1 plate.

Dependence of the persistence of this effect on the reheating temperature and rate. Secondary intragrain texture, and transformation of austenite into perlite-troostite. Micrographs, graphs. 6 ref.

12097* Influence of the Chemical Composition of Silicate Inclusions on the Properties of Gray Irons. **Influence de la composition chimique des inclusions silicatées sur les propriétés des fontes grises.** (French.) André Roos. *Fonderie*, 1955, no. 111, Apr., p. 4465-4473.

Describes aceto-cupric method of determining silica inclusions in gray irons. Diagram, photographs, graphs, micrographs, tables. 10 ref.

Metals—Metallography, Transformations, and Structures

12098* Micrographic Study of the Eutectoid Transformation in Nonalloyed Cast Irons. **Étude micrographique de la transformation eutectoïde dans les fontes non alliées.** (French.) Michel Ferry and Gabrielle Aubrion. *Fonderie*, 1955, no. 112, May, p. 4497-4512.

Study of different structural changes appearing in cast irons during cooling or continuous heating, temperature variations being of the order of 150 C per hr. Diagrams, micrographs. 16 ref.

12099* Heat Treatment of Cast Steels. **Traitement thermique des aciers moulés. I.** (French.) *Fonderie*, 1955, no. 112, May, p. 4529-4533.

Heterogeneity of steel produced by its solidification; microscopic structure of steel due to cooling after solidification. Diagrams, micrographs. (To be continued.)

12100 Metals, Perfect and Imperfect. T. E. Allibone. *Foundry Trade Journal*, v. 98, June 23, 1955, p. 667-675.

Review of the development of our knowledge of metallic crystals and indication of the direction from which further advances are likely to come. Diagrams, photographs, micrographs, graphs. 23 ref.

12101* Electron Diffraction Method and Its Use in Metallography; Especially in the Metallography of Steel. **Elektronová difraktografie a její použití v metalografii, speciálně v metalografii oceli.** (Czech.) František Králík. *Hutnické Listy*, v. 10, no. 5, May 1955, p. 262-266.

Method used to study the structure of fracture surfaces and structural changes during secondary steel hardening. Micrographs. 10 ref.

12102 A Three-Dimensional Face-Centred Cubic Model for the Study of Crystal Phenomena. P. R. Rowland. *Institute of Metals, Journal*, v. 83, June 1955, p. 455-459 + 1 plate.

The model, containing 10^3 to 10^4 lattice units, is rapidly and accurately assembled by pouring steel ball bearings into a suitable transparent mold. Manipulation of the model has revealed a hitherto unsuspected lattice transformation, which results in the production of two new face-centered lattices bearing a twin relationship to each other but not to the original lattice. Diagrams, photographs, micrograph. 3 ref.

12103* Electron-Diffraction Study of the Composition of Oxidation Films on Iron and Different Binary Alloys. **Étude par diffraction électronique de la constitution des films d'oxydation sur le fer et différents alliages binaires.** (French.) J. Moreau and J. Bénard. *Institut de Recherches de la Sidérurgie, Publications*, ser. A, no. 109, May 1955, 26 pages + 12 plates. (TN602 In7p)

The nature of the constitutive phases of oxidation films on Fe and Fe-Ni, Fe-Cr, and Ni-Cr alloys; development of structure and texture of these phases during oxidation. Tables, diagrams, micrographs.

12104 How to Improve the Quality of Deep Drawing Steel. E. R. Morgan and J. C. Shyne. *Iron Age*, v. 175, June 23, 1955, p. 91-94.

Avoidance of strain aging and stretcher strains by control of composition, omission of temper rolling before shipping, or stabilization of dissolved N. Diagrams, graphs.

12105 Atomic Interaction in Molten Alloy Steels. John Chipman. *Iron and Steel Institute, Journal*, v. 180, June 1955, p. 97-106.

Interactions between two or more dissolved elements in liquid Fe are examined through the effect of one on the activity coefficient of the other. Table, graphs. 40 ref.

12106 The Strain Ageing of Alpha-Iron. W. R. Thomas and G. M. Leak. *Iron and Steel Institute, Journal*, v. 180, June 1955, p. 155-161.

Data on the rates of strain aging on specimens containing only N and on those containing only C. Table, graphs. 16 ref.

12107* The Decomposition of Martensite in Iron-Carbon Alloys. **Martensitens sönderfall i järn-kollegeringar.** (Swedish.) Gunnar Folke and Erik Nygren. *Jerkontorets Annaler*, v. 139, no. 4, 1955, p. 250-264.

Decomposition in high purity Fe-C alloys ranging from 0.15 to 1.42% C and in C steel was studied by X-ray diffraction methods. Tables, graphs. 27 ref.

12108 Work Function of Tungsten Single Crystal Planes Measured by the Field Emission Microscope. Erwin W. Müller. *Journal of Applied Physics*, v. 26, June 1955, p. 732-737.

Method combines the field emission microscope with a probe collector. The current density in the (011) plane turned out to be 4 to 5 orders of magnitude smaller than in strongly emitting planes. Diagrams, graphs, table, photograph. 21 ref.

12109 Thermionic Emission Microscopy of Metals. I. General. R. D. Heidenreich. *Journal of Applied Physics*, v. 26, June 1955, p. 757-765.

An electrostatic emission microscope operating with an accelerating voltage of 10-25 kv. is described; factors determining image quality, particularly contrast and resolution; interpretation of images on the basis of the Schottky emission equation. Diagrams, tables, micrographs. 15 ref.

12110 Solid State Diffusion in the Reduction of Magnetite. J. O. Edstrom and G. Bitsianes. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, June 1955, p. 760-765.

Parabolic rate constants are determined for the formation of wüstite by the solid state reaction between magnetite and Fe. Reaction was diffusion controlled and inert marker studies indicated that the mass transport through the wüstite layer was accomplished by means of Fe migration. Diagram, graphs, micrographs, table. 19 ref.

12111 Intermediate Phases in the Cr-Mo-Co System at 1300 C. J. B. Darby, Jr. and P. A. Beck. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, June 1955, p. 765-766.

Study of the Cr-Mo-Co ternary system and some notes on the new ternary phase, D, of unknown and apparently complex crystal structure. Diagrams, table. 2 ref.

12112 Diffusion in Liquid-Bismuth Alloys. R. E. Grace and G. Derge. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, July 1955, p. 839-842.

Diffusivity was measured by the capillary reservoir method as a function of temperature and composition. Tables, diagrams, graphs. 13 ref.

12113* Formation of Large Surface Grains in Brass From Evaporation of Zinc. **Beitrag zur Bildung von Randstengelkorn in Messing beim Ausdampfen von Zink.** (German.) F. Erdmann-Jesnitzer and F. Günther. *Metall*, v. 9, no. 9-10, May 1955, p. 377-381.

Heat-treating experiments; micro-structure and X-ray examinations of specimens. Micrographs, graphs, diagrams, X-rays. 14 ref.

12114* Hexagonal Structures in Monocrystals. **Sechseckstrukturen in Einkristallen. I.** Segregation of Impurities in Metal Crystals Growing in the Melt. **Zur Ablagerung von Verunreinigungen in aus der Schmelze wachsenden Metallkristallen.** (German.) F. Blaha. *Metall*, v. 9, no. 9-10, May 1955, p. 390-394.

Effect of temperature, cooling rate, atmospheric conditions, and impurities on the crystallization of Zn and Sn. Micrographs, graph. 17 ref.

12115 Factors Influencing the Chilling of Cast Iron. W. J. Williams. *Metallurgia*, v. 51, no. 308, June 1955, p. 273-279.

Effects of chemical composition, nature of the charge, melting conditions, and inoculation on graphitization of gray iron. Diagram, photographs, micrographs, tables. 7 ref.

12116 Principles and Applications of Step Quenching (Martempering). Richard F. Harvey. *Metal Treating*, v. 6, May-June 1955, p. 6-8, 10-11.

Structural effects of interrupted quenching; isothermal transformations; mechanical working effects. Diagrams, graphs, table.

12117* Iron Content and Size of Grains in an Annealed Zinc Alloy With 0.3% Pb - 0.3% Cd. **Teneur en fer et grosseur des grains dans un alliage recuit de zinc à 0.3% Pb - 0.3% Cd.** (French.) L. Boschi, H. Destaillats, J. Sabato, J. Walls, and A. Varsavski. *Métaux-Corrosion-Industries*, v. 30, no. 355, Mar. 1955, p. 105-107.

Influence of Fe impurity on grain size; new technique for measuring grain size without using polarized light. Tables, graph, micrographs. 6 ref.

12118* An Electroacoustical Study on Cold-Working and Recrystallization of Aluminium. (English.) F. Gatto. *Nuovo cimento (Supplemento)*, v. 1, ser. 10, no. 2, 1955, p. 124-125.

Measurement of elastic constants can be applied to studying the phenomena connected with cold-working and recrystallization of metals. Graphs.

12119* Transport Phenomena in Melts and the Mechanism of Melting. (English.) A. R. Ubbelohde. *Nuovo cimento (Supplemento)*, v. 1, ser. 10, no. 2, 1955, p. 126-138; disc., p. 138-139.

Discussion of the transport phenomena, in particular the viscosity of the melts near the freezing point, and some significant facts about the thermodynamic parameters of melting. Graphs, tables. 17 ref.

12120* Self-Diffusion in Liquid Metals. (English.) G. Careri and A. Paoletti. *Nuovo cimento (Supplemento)*, v. 1, ser. 10, no. 2, 1955, p. 161-164; disc., p. 164-165.

Brief report on some measurements of the self diffusion coefficient on the basis of theories of the liquid state. Tables.

12121* On the Detection of the Polygonization by the Diffraction of X-Rays. **Sur la détection de la polygonisation par la diffraction des rayons X.** (French.) A. R. Weill. *Revue de métallurgie*, v. 52, no. 4, Apr. 1955, p. 294-306.

X-ray methods for recognizing the polygonization of metals and alloys, either induced at the laboratory, or spontaneously formed during industrial processing. Photographs. 20 ref.

12122* A Study of the Micro-Structure of Plastic Deformation of Solid Solution Cu-Zn With 65 to 66% Cu and Its Evolution During Annealing. Particular Case of the Deformation by Abrasion. **Étude sur la microstructure de déformation plastique de la solution solide cuivre-zinc à 65-66% de cuivre et sur son évolution au cours du recuit.** (French.) Pierre A. Jacquet. *Revue de métallurgie*, v. 52, no. 4, Apr. 1955, p. 307-325; disc., p. 325-326.

Points of attack changes during step annealing, up to final stage of typical polygonization, confirmed by X-rays. Micrographs, tables. 12 ref.

12123 Technique of Microautoradiography for Metal Specimens. Robert C. Plumb. *Review of Scientific Instruments*, v. 26, May 1955, p. 489-493.

It is capable of producing a resolution of at least nine μ with X-radiation and supplying quantitative information as to the distribution of radioactive material in a metallurgical structure. Diagrams, micrographs. 11 ref.

12124 Electronic Vacuum Dilatometer. M. E. Dooley and D. F. Atkins. *Review of Scientific Instruments*, v. 26, June 1955, p. 568-571.

Description of the apparatus and several of its advantages are enumerated. Several curves are reproduced to illustrate the performance of the instrument. Diagrams, graphs. 5 ref.

12125 Dislocations in Metals. Frank B. Cuff, Jr. and L. McD. Schetky. *Scientific American*, v. 193, July 1955, p. 80-87.

Many important properties of metals are now understood to result from a kind of imperfection in crystal lattices that is called a dislocation. A large group of properties which previously could be studied only in an empirical way are now being rationally analyzed. Photographs, diagrams.

12126* Comparison Tests on the Work Hardening in Flat Rolling and Drawing of Round Wire. **Vergleichende Untersuchungen über die Verfestigung beim Flachwalzen und Ziehen von Runddraht.** (German.) Werner Lueg and Karl-Heinz Treptow. *Stahl und Eisen*, v. 75, no. 12, June 16, 1955, p. 757-767.

Effects of the wire material, of the roll diameter, and of the reduction on the work hardening in flat rolling. Interpretation of the differences determined in work hardening. Diagram, tables, graphs, micrographs. 20 ref.

12127 Progress Report on Loading of Titanium With Deuterium. James W. Ruff. *U. S. Atomic Energy Commission* UCRL-4496, May 1955, 7 p. (UF767 U3u)

A system that permitted loading with deuterium gas of high purity was designed and built. Some of the parameters affecting amounts and purity of the absorbed gas were investigated. Diagrams. 5 ref.

12128 Considerations in the Evaluation of Graphitization in Piping Systems. Helmut Thielsch, E. M. Phillips, and E. R. Jerome, Jr. *Welding Journal*, v. 34, June 1955, p. 286S-294S.

Laboratory investigations of graphitized piping, sampling, bend and impact testing, and metallographic grading; interpretation of test results; no. of specimens required; effects of heat treatments. Photographs, diagrams, graphs, tables, micrographs. 3 ref.

12129* Development of Binary Alloy Phase Diagrams in Connection With the Interaction Between Particles of Alloyable Elements. **O razvitii diagramm sostoianiia dvoinykh splavov v sviazi s vzaimodeistviem mezhdu chastitsami splavliaemykh elementov.** (Russian.) T. Lebedev. *Zhurnal Obshchei Khimii*, v. 25, no. 5, May 1955, p. 898-902.

Provides new systematization where gradations of the combinations of elements and transition of these gradations from one type to another are indicated. Diagrams. 5 ref.

12130* Methods of Growing Monocrystals of Metals With a Given Spatial Orientation and With Natural Crystallographic Faces. **K metodike vyrashchivaniia monokristallov metallov s zadannoi prostranstvennoi orientatsiei i s estestvennymi kristallograficheskimi graniami.** (Russian.) D. M. Chigvinadze. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 5, May 1955, p. 805-811.

Bridgman's and other methods for obtaining monocrystals of Zn and its alloys, including descriptions of apparatuses, heating temperatures, etc. Microstructure of natural crystallographic faces. Diagrams, micrographs. 10 ref.

12131* Study of Some Cases of Block Formation in Aluminum and of the Role of Impurities in the Delineability of the Blocks. **Izuchenie nekotorykh sluchaev blokoobrazovaniia v aliuminii i roli primesei v vyiavliaemosti blokov.** (Russian.) I. E. Bolotov, Iu. D. Kozmanov, and A. N. Timofeev. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 5, May 1955, p. 887-896.

Study of the polygonization of distorted single crystals and of the mosaic structure of single crystals that have undergone thermal fatigue. Micrographs. 15 ref.

12132* Third Transformation During the Tempering of Steel. **O tret'em prevrashchenii pri otpuske stali.** (Russian.) V. G. Permiakov. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 5, May 1955, p. 908-915.

Carbide reactions involved in the third transformation during tempering; heating temperature at which intermediate carbide passes into cementite; dilatometric and magnetometric curves. Diagram, graphs, table. 16 ref.

12133* Linear Rate of Crystallization of Metals. **O lineinoi skorosti kristallizatsii metallov.** (Russian.) B. M. Maslennikov. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 5, May 1955, p. 933-938.

Solution of thermal conductivity problem and the experimental verification of this solution. Tables. graph. 13 ref.

See also:

11613 (lattice constant measurement of crystals)
11872 (strain aging of steel)
11880 (strain aging of steels)
11949 (supersaturated solid zinc solutions)
12183 (tin transformations by irradiation)

METALS—POWDER

12134 Titanium-Carbide-Base Cermets for High-Temperature Service. K. Pfaffinger, H. Blumenthal, and F. W. Glaser. *American Society for Testing Materials, Preprint No.* 94b, 1955, 10 p. (TA401 Am35p)

Development, physical properties, and production procedures of Ti C-base cermets containing 25 to 65% of Ni-Cr or Ni-Co-Cr binder. Tables, graphs, photographs. 7 ref.

12135 Titanium-Carbide Products Produced by the Infiltration Technique. Leonard P. Skolnick and Claus G. Goetzel. *American Society for Testing Materials, Preprint No.* 94g, 1955, 7 p. (TA401 Am35p)

This technique permits the use of low pressures for compacting the powders, making possible direct pressing of complex shapes. Infiltration *per se* permits the production of void free bodies of remarkably true shape and close dimensional tolerances, and in many aspects is strikingly similar to precision casting. Table, photograph, graphs, micrographs. 5 ref.

12136 Infiltration of Porous Tungsten With Copper and Silver. (Part III of "Sintered Electric Contact Materials".) W. Rutkowski and S. Stolarz. *Henry Brutcher Translation No.* 3481, 20 p. (From *Prace Glownego Instytutu Metalurgii*, v. 4, no. 1, 1952, p. 67-81.) Henry Brutcher, Altadena, Calif.

Numerical data on influence of various factors, such as particle size of W powders, compacting pressure, sintering temperature, and infiltration time upon density of W skeletons before and after infiltration; porosity of W skeletons; amount of Cu, etc., infiltrated; hardness; electrical conductivity; loss of wt. on arcing. Tables, micrographs. 5 ref.

12137 Sintering Powdered Metals. J. Lomas. *Machinery Lloyd (Overseas Ed.)*, v. 27, May 21, 1955, p. 85-86.

Effects of surface tension, vol., and porosity are discussed. Diagram.

12138 Magnetic Powder Cores. C. Gordon Smith. Paper from MAGNETIC ALLOYS AND FERRITES. p. 159-170. 1954. George Newnes, London. (QC761 Sa98m)

Development, applications and permeability of iron powders, Fe-Al-Si alloys, Ni-Fe, and related alloy powders. Graphs, photograph, table. 18 ref.

12139 Titanium Powder Metallurgy. H. W. Dodds. *Metal Industry*, v. 86, June 10, 1955, p. 489-490.

Fabrication of parts by press formed compacts. Graphs, table, diagram, photographs.

12140* Rosin-Rammler's Distribution of Grain Size in Ground Powders. **Über die Rosin-Rammler'sche Verteilung der Korngrössen in Mahlpulvern.** (German.) R. Brenner and A. Vidmajer. *Metall*, v. 9, no. 9-10, May 1955, p. 395-403.

Determination of distribution maxima from experimentally determined distribution and grain-size parameters. Graphs. 4 ref.

12141 Nickel Alloys Made by Powder Metallurgy Techniques. *Metallurgia*, v. 51, no. 307, May 1955, p. 215-217.

Closer control over composition possible in the production of Ni and Ni alloys by powder metallurgy methods results in an improvement in properties which is particularly valuable in the electronic field. Tables. 1 ref.

12142 Powdered Iron Applications. J. A. Roberts and G. O. Altman. *Tele-Tech & Electronic Industries*, v. 14, sec. 1, June 1955, p. 94 + 9 pages.

Manufacturing requirements for types of Fe, together with physical and electromagnetic characteristics, for guide utilization coils, tuner cores, and direction finders. Photographs, table. 17 ref.

12143* Fayalite Sinter Compacts. **Spieki fajalitowe.** (Polish.) Zdzisław Kotas. *Wiadomości Hutnicze*, v. 11, no. 2, Feb. 1955, p. 43-45.

Fayalite sinter compact is defined as an iron powder product in which, during sintering, there appears a ferrous orthosilicate ("fayalite") of the composition $2FeO \cdot SiO_2$ which acts as a bonding agent. Although more fuel is required for sintering this material, its advantages include strength and resistance to weathering. Graphs. 3 ref.

12144* Influence of the Electrolyte Concentration on the Temperature Effect at the Cathode During the Electrolytic Deposition of Metallic Powders. **Vliianie kontsentratsii elektrolita na temperaturnyi effekt na katode pri elektroosazhdenii metallicheskikh poroshkov.** (Russian.) D. N. Gritsan and A. M. Bulgakova. *Zhurnal Fizicheskoi Khimii*, v. 29, no. 4, Apr. 1955, p. 649-652.

Emperical equations are developed for electrolytic production of Cd, Cu, and Zn powders. Graphs, table. 6 ref.

12145* New Method of Determining the Grain Size and Unit Surface Area of Powders Used in Powder Metallurgy. **Novyi metod opredeleniia razmera zeren i udel'noi poverkhnosti poroshkov, primeniaemykh v metallokeramike.** (Russian.) B. V. Deriagin, N. N. Zakhavaeva, and M. V. Talaev. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 5, May 1955, p. 881-886.

The Deriagin method and apparatus (based on filtration of rarefied air through the powder) are described, and the equations given. Photographs, graph, table. 11 ref.

MINING ENGINEERING

12146* Biogeochemical Prospecting at the Shawangunk Mine—A Case Study. Joseph E. Worthington. *Economic Geology*, v. 50, June-July 1955, p. 420-429.

Testing the effectiveness of biogeochemical analyses in exploring for bodies of Pb and Zn ore known to crop out in an area of moderate rainfall and temperature. Diagram, table. 8 ref.

12147* Rock Drilling With Hard Metals. *Mechanical World and Engineering Record*, v. 135, May 1955, p. 222-226.

Reviews developments in the properties of hard metals and discusses the choice of composition and grain-size for rock-drilling applications, outlines the problems associated with the steel stem and brazing, and considers manufacturing procedure and applications. Micrographs, photographs. 1 ref.

NONDESTRUCTIVE TESTING

12148 Report of Committee A-1 on Steel. *American Society for Testing Materials, Preprint No.* 1, 1955, 45 p. (TA401 Am35p)

Tentative recommended practices for ultrasonic testing and inspection of heavy steel forgings. Proposed specifications for Cr-Mo steel plates for boilers and other pressure vessels; alloy steel castings normalized and drawn for high pressure and elevated temperature service and alloy steel chain. Tables.

12149 Report of Committee E-7 on Non-Destructive Testing. *American Society for Testing Materials, Preprint No.* 60, 1955, 23 p. (TA401 Am35p)

Proposed tentative method for dry powder magnetic particle inspection. Photographs.

12150* Measuring the Thicknesses of Materials. **Meting van materiaaldikten.** (Dutch.) R. Smit. *Bedrijf en Techniek*, v. 10, no. 229; *Electronica section*, v. 8, no. 176, June 4, 1955, p. 89-92.

Design and operation of X-ray, β- and γ-ray thickness meters. Diagrams, graph. 8 ref.

12151 New Testing Methods Increase Foundry Efficiency. W. J. Stewart. *Canadian Metals*, v. 18, June 1955, p. 40-42.

Use of X-ray and γ-ray radiography, magnetic particle, liquid penetrant, and ultrasonic waves in nondestructive testing. Diagrams, photographs.

12152 Improved Radiographs by Means of Tungstate Intensifying Screens. F. Goos and T. Maas. *Engineers' Digest*, v. 16, June 1955, p. 271-272, 298. (From *Schweissen und Schneiden*, v. 6, no. 11, Nov. 1954, p. 447-450.)

Results of tests given are limited to investigations of steel thicknesses not exceeding 40 mm. and voltages up to 150 kv. Graphs.

12153 Testing and Inspection—1855 to 1955. *Iron Age (100th Anniversary Issue)*, v. 175, June 1955, p. 2K-12K.

Review of nondestructive test methods and instrumentation, gaging; developments and future prospects. Photographs.

12154* Inspection of Metallurgical Products by Ultrasonics. **Kohászati termékek vizsgálata ultrahanggal.** (Hungarian.) Pál Réti. *Kohászati Lapok*, v. 10, no. 5, May 1955, p. 215-222.

Hungarian experience on ingots, steel rods, large forged pieces, thick-walled tube and plates. Diagrams, photographs.

12155* Simple Tests for Identifying Metals by Appearance, Chip Test, and Blowpipe Test. *Linde Tips*, v. 34, July 1955, p. 58-59.

Identification by using appearance of fracture, unfinished and newly machined surfaces, chip size, facility of chipping, speed of melting, color change while heating, slag, and action of slag are given in table form. Table.

12156 Where and How Spectrography Can Help You. Howard E. Boyer and Frank E. Fitzgerald. *Materials & Methods*, v. 41, June 1955, p. 95-99.

A flexible and useful tool that has proved its worth in many metal fabricating plants for rapidly identifying and sorting alloys and for determining their composition. Spectrograms, diagram, graphs.

12157* Testing the Thickness and Adhesion of Electroplated Coatings. *Mechanical World and Engineering Record*, v. 135, June 1955, p. 256-261.

Coatings thickness and quality tested by the B.N.F. jet-test; describes test and apparatus. Diagrams, tables, graphs. 10 ref.

12158 Quality Control Instrumentation. C. M. Gilmour. *Metal Industry*, v. 86, June 24, 1955, p. 529-532.

Use of radioactive isotopes and ultrasonics in measuring thickness and flaw detection. Table, diagrams, photographs.

12159* Materials Testing in Electroplating. **Materialprüfung in der Galvanotechnik.** (German.) J. Elze. *Metall*, v. 9, nos. 11-12, June 1955, p. 458-465.

Methods of testing metal platings and anodic oxide coatings for thickness, surface condition, porosity, hardness, internal stresses, impurities, and electrical properties. Photograph, graphs, tables, diagrams. 11 ref.

12160* Industrial Control by Ultrasonics. **Contrôle industriel par les ultra-sons.** (French.) Jean Daurat. *Métallurgie et la construction mécanique*, v. 87, no. 5, May 1955, p. 379, 381, 383, 385.

Cast barium titanate ceramics; correlating mechanical-resonance and shearing tests; control of brazed contacts. Micrographs, tables, graphs.

12161* Electron Microscopy Can Aid Machining Research. *Metalworking Production*, v. 99, Apr. 22, 1955, p. 714-715.

Surface roughness indications by an electron beam almost parallel to the material surface. Micrographs.

12162* Non-Contact Hardness Tester Sorts Castings Magnetically. Milton J. Diamond. *Metalworking Production*, v. 99, June 17, 1955, p. 1091-1092.

Automatic magnetic comparator measures hardness of steel rocker arms for automobile engines at 3,000 pieces per hr. Photograph, diagrams.

12163* The Preparation and Handling of Intense Radioactive Sources. P. J. Stewart. *Nondestructive Testing*, v. 13, May-June 1955, p. 11-13, 33.

Importance of neutron fluxes and reactor size in the production of radioactive materials. Handling of γ-ray sources for industrial radiography. Photographs.

12164* Radiography of Small Castings With High Cobalt or Nickel Content. E. Alfred Burrill. *Nondestructive Testing*, v. 13, May-June 1955, p. 19-21.

Describes the radiographic problems introduced by these castings and the development of an economical technique using a 1-million-v. Van de Graaff X-ray generator as the source of penetrating radiation. Photograph, diagram.

12165* Industrial Xeroradiography in 1955. Robert G. Vyverberg, Harold E. Clark, and John H. Dessauer. *Nondestructive Testing*, v. 13, May-June 1955, p. 35-40.

The process is based on a photoconductive layer which is electrostatically sensitized, exposed to X-rays, and then developed by passing over it an oppositely charged powder to form a visible image. Photographs, diagrams. 9 ref.

12166* Non-Destructive Testing. *Railway Locomotives and Cars*, v. 129, June 1955, p. 57-60.

Testing of railroad parts and equipment used to promote safety, improve inspection, give quality control of materials, and reduce overall costs. Photographs.

12167* Development of Nondestructive Testing and the Problems of Its Application. **Die Entwicklung der zerstörungsfreien Prüfverfahren und die Problematik ihrer Anwendung.** (German.) M. Pfender and O. Vaupel. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 24-33.

Review of nondestructive testing methods; recent developments in the preferred methods of testing weld joints; factors to be considered in the use of nondestructive testing methods, and in the evaluation of test results. Tables, diagrams, photographs, graphs.

12168* Nondestructive Testing of Materials and Its Limitations. **Die zerstörungsfreie Werkstoffprüfung und ihre Grenzen in der Praxis.** (German.) P. Gayer. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 33-37.

Detection of shallow and deep surface cracks, precipitations, and defects in austenitic steels and welds; determination of mutual adhesion of two different materials; comparison of ultrasonic and X-ray tests; preference of using radioactive isotopes over X-rays for testing welded pipelines. Table, photographs.

12169* Comparison Tests on the Accuracy of the Supersonic Test of Large Forgings. **Vergleichsversuche zur Anzeigegenauigkeit der Überschallprüfung bei grossen Schmiedestücken.** (German.) Werner Türk, Walter Knorr, and Klaus Barteld. *Stahl und Eisen*, v. 75, no. 10, May 19, 1955, p. 629-633.

Comparison of supersonic and destructive testing by nine separate groups of testers. Diagrams, photographs. 7 ref.

12170 Weld Quality—"Score-Card" Aids Industrial Control. E. C. Osborne. *Steel Processing*, v. 41, June 1955, p. 363-366.

Charts and control procedures for industrial welding operations. Graphs.

12171* Methods and Instruments for Measuring Technical Surfaces. **Metoder og instrumenter for måling av tekniske overflater.** (Norwegian.) Kjoergaard Nissen. *Teknisk Ukeblad*, v. 102, no. 21, May 26, 1955, p. 435-439.

Different optical and interference methods of evaluating surface condition. Diagrams, micrographs, photographs. (To be continued.)

12172* Methods and Instruments for Measuring Surfaces. **Metoder og instrumenter for måling av tekniske overflater.** (Norwegian.) Kjoergaard Nissen. *Teknisk Ukeblad*, v. 102, no. 22, June 2, 1955, p. 463-469.

Methods and devices for determining the surface roughness and surface texture of different materials. Diagrams, graphs, photograph. 8 ref.

See also:

11765 (inspection of steel by radioactive isotopes)

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

12173 Variation in the Natural Abundance of the Lithium Isotopes. A. E. Cameron. *American Chemical Society, Journal*, v. 77, May 20, 1955, p. 2731-2733.

Analysis and study of 24 different samples. Table. 12 ref.

12174 Atomic Power Reactors and Their Fuels. II. J. C. Horsman. *Chemistry in Canada*, v. 7, June 1955, p. 48-52.

Problems with solid and fluidized fuels are covered. Diagrams, photographs. 4 ref.

Nuclear Physics, Nucleonics, and Radiation

12175* Significance of Recoil, in Phosphorus, of P_{30} Obtained by the Reaction P_{31} $(\gamma,n)P_{30}$. Application to the Preparation of P_{30} Without Entraining Agent. **Portée du recul, dans le phosphore, de ^{30}P obtenu par la réaction $^{31}P(\gamma,n)^{30}P$. Application à la préparation de ^{30}P san entraîneur.** (French.) Jules Pauly and Pierre Süe. *Comptes rendus*, v. 240, no. 23, June 26, 1955, p. 2226-2228.

Includes graph. 2 ref.

12176 Radiation Counter for Beta Particles. D. T. Williams. *Electrical Engineering*, v. 74, July 1955, p. 595-598.

A conduction-type counter was designed which uses a Cd-sulfate crystal mounted in a hypodermic needle. A probe preamplifier of low noise was designed to be used with it. An analysis of the geometry of the problem was derived to yield the counting rate in terms of the crystal size, concentration of radioactive atoms, their mean life, and the end-point energy of the β particles. Photographs, tables, circuit diagram, diagram. 3 ref.

12177* Magnetic Amplifiers. **Gli amplificatori magnetici.** (Italian.) G. Giannelli. *Energia Nucleare*, v. 2, no. 14, Apr. 1955, p. 239-248.

Use of magnetic reactors in the control and regulation of nuclear reactors. Diagrams. 4 ref.

12178* Measuring Nuclear Magnetic Moments and Their Applications in Chemical Analysis, Isotopic Analysis, and in the Study of Molecular Structure. **La misura dei momenti magnetici nucleari e le sue applicazioni nell'analisi chimica, nell'analisi isotopica e nello studio della struttura molecolare.** (Italian.) E. Zimmer. *Energia Nucleare*, v. 2, no. 14, Apr. 1955, p. 249-256.

Describes measuring methods and equipment. Graph. 8 ref.

12179* Effectiveness of Control Rods in a Cylindrical Reactor. **Valutaziòne dell'efficienza delle barre di controllo in un reattore cilindrico.** (Italian.) A. Ascari. *Energia Nucleare*, v. 2, no. 14, Apr. 1955, p. 272-283.

Considers the dependence of the rods' effectiveness upon the dimensions of reactor, no. of rods, and radius of ring and rods. Graphs, diagram. 7 ref.

12180* Prospects for Utilization of Atomic Energy for Production of Electric Energy. **Aussichten auf die Ausnutzung der Atomenergie zur Erzeugung von Elektroenergie.** (German.) V. Petržilka. *Energietechnik*, v. 5, no. 5, May 1955, p. 199-206.

Survey of possibilities of future power generation by atomic energy; types of reactors used today; comparative cost of produced energy; advantages and disadvantages. Diagrams, graph, tables. 22 ref.

12181* **Thermonuclear Reactions.** John S. Walker. *Foreign Affairs*, v. 33, July 1955, p. 605-614.

If and how they can be used for man's benefit.

12182* **The *Q* in Nuclear.** Clyde C. Scott. *Instrumentation*, v. 8, no. 1, 1955, p. 11-13.

Unlike research reactors, nuclear power reactors have a dual nature, part chain reaction and part heat source. Both must be considered in the design of a successful control system. Diagrams, photograph.

12183 Effect of Reactor Irradiation on the White-to-Grey Tin Transformation. Jerome Fleeman and G. J. Dienes. *Journal of Applied Physics*, v. 26, June 1955, p. 652-654.

Effect of low-temperature (liquid N) reactor irradiation. The transformation, measured by dilatometry, is drastically accelerated. Graph, table.

12184* Independence of Charge in Nuclear Physics. **Indépendance de charge en physique nucléaire.** (French.) R. E. Marshak. *Journal de physique et le radium*, v. 16, no. 4, Apr. 1955, p. 325-334.

Data on energy levels and high-energy nucleon-nucleon diffusion. Independence of charge for the meson-nucleon system and the meson—π-nucleon system. 33 ref.

12185* Excited Levels of Li_7 and Be_9 Shown in the Disintegration of Be_9 by Low-Energy Deuterons. **Sur les niveaux excités di Li^7 et Be^9 mis en évidence dans la désintégration de Be^9 par les deutérons de faibles énergies.** (French.) P. Cüer and J. J. Jung. *Journal de physique et le radium*, v. 16, no. 5, May 1955, p. 385-387.

Studies by photographic methods, after magnetic separation, of emitted particles. Graph. 16 ref.

12186* Study of the Disintegration of Pd_{103}. **Étude de la désintégration du ^{103}Pd.** (French.) P. Avignon, A. Michalowicz and R. Bouchez. *Journal de physique et le radium*, v. 16, no. 5, May 1955, p. 404-410.

Disintegration of Pd_{103} is studied using a thin-lens β-spectrometer and a scintillation γ-spectrometer. Graphs, tables. 18 ref.

12187* **Radioactive Tracing. IV. Operation of Particle Counters.** F. P. W. Winteringham. *Laboratory Practice*, v. 4, June 1955, p. 244-250.

Probe-quench and scaling units, ratemeters, and other components considered. Table, graph, diagrams, photographs. 10 ref. (To be continued.)

12188* **Radio-Isotopes in Industry.** *Mechanical World and Engineering Record*, v. 135, May 1955, p. 204-208.

Industrial uses of radio-isotopes are now numerous for control, measurement, analysis, and research. Main scope of radio-isotopes is still as tracer elements. Diagrams, tables.

12189 Observations on Heavy Mesons and Hyperons. *Nature*, v. 175, June 4, 1955, p. 971-973.

A joint analysis of balloon photographic observations made at 78,000 to 85,000 ft. over Italy. Graph. 7 ref.

12190 The 156-In. Cyclotron at Liverpool. M. J. Moore. *Nature*, v. 175, June 11, 1955, p. 1012-1013.

Mechanical and technical details of the device. Diagrams, photographs. 3 ref.

12191 Diffusion Cloud-Chamber Study of Very Slow Mesons. I. Internal Pair Formation. C. P. Sargent, R. Cornelius, M. Rinehart, L. M. Lederman, and K. Rogers. *Physical Review*, v. 98, ser. 2, June 1, 1955, p. 1349-1354.

A beam of negative π and μ mesons was moderated to very low energies and allowed to enter a H-filled 20-atmosphere continuously sensitive cloud chamber. The various phenomena were observed and classified. Diagrams, photographs, tables. 15 ref.

12192 Nuclear Cross Sections for 1.4-Bev Neutrons. T. Coor, D. A. Hill, W. F. Hornyak, L. W. Smith, and G. Snow. *Physical Review*, v. 98, ser. 2, June 1, 1955, p. 1369-1386.

Transmission measurements in good and poor geometry were performed at the Brookhaven Cosmotron to measure the total and absorption cross sections of several nuclei for neutrons in the b.e.v. energy range. Tables, diagrams, graphs. 42 ref.

12193* **Atomic Radiations Change Materials.** C. Mannal, C. A. Bruch, and R. F. Koenig. *Power*, v. 99, July 1955, p. 94 + 6 pages.

Design engineers planning nuclear reactors must deal with radiations as an additional factor to the more usual wt., strength, hardness, thermal conductivity, and electrical resistivity considered in many machinery arrangements. Photographs, graphs, table, diagrams, micrographs. 5 ref.

12194* **Radiation in the Pharmaceutical and Drug Industries.** *Radiation Applications*, 1955, May, 4 p.

Applications in the field are radioactive tracers and radiation sterilization.

12195* **Nuclear Binding Energies.** J. Mattauch. *Science*, v. 121, May 27, 1955, p. 745-750.

Recent advances in mass spectrography. Mass spectrograms. 3 ref.

12196 Current Status of Information on the Induction of Mutations by Irradiation. Herman M. Slatis. *Science*, v. 121, June 10, 1955, p. 817-821.

Details of the effects on heredity. 13 ref.

12197 Low-Energy Physics From a High-Energy Standpoint. L. I. Schiff. *Science*, v. 121, June 24, 1955, p. 881-884.

Reviews studies in the ground, or low energy states, usually with muons, electrons, and photons. 40 ref.

12198 The Role of Crystal Structure on Irradiation Effects on Metals. D. Wruck and C. Wert. *U. S. Atomic Energy Commission, AECU-2906*, Apr. 1955, 24 p. (UF767 U3au)

The resistivity of Fe was determined to increase more than that of Co and Ni when these metals are bombarded at −150 C by 12 m.e.v. deuterons. The same effect was observed for Fe and Ni by neutron irradiation at room temperature. Graphs, diagram, table. 3 ref.

12199* Isotope Shift in the Hafnium II Spectrum. **Isotopieverschiebung im Hafnium II-Spektrum.** (German.) Eberhard Finckh and Andreas Steudel. *Zeitschrift für Physik*, v. 141, nos. 1-2, 1955, p. 19-27.

Investigations with a Fabry-Perot interferometer in the range of 2600 to 2800 Å; computation of the isotope-shift constant. Tables. 25 ref.

12200* Isotope Conditions of "Ordinary" Pb and Their Importance. **Isotopenverhältnisse von "gewöhnlichem" Blei und ihre Deutung.** (German.) P. Eberhardt, J. Geiss, and F. G. Houtermans. *Zeitschrift für Physik*, v. 141, nos. 1-2, 1955, p. 91-102.

Determination of the isotope compositions of 60 Pb samples from different sources, their radioactive inclusions and geological age. Table. 33 ref.

12201* On the Isotope Shift in the Cu I-Spectrum. **Zur Isotopieverschiebung im Cu I-Spektrum.** (German.) Siegfried Wagner. *Zeitschrift für Physik*, v. 141, nos. 1-2, 1955, p. 122-145.

Separation and optical investigation of Cu isotopes. Diagrams, tables. 31 ref.

12202* Hyperfine Structure and Nuclear Moments of Kr^{85}. **Hyperfeinstruktur und Kernmomente von Kr^{85}.** (German.) Ebbe Rasmussen and Victor Middelboe. *Zeitschrift für Physik*, v. 141, nos. 1-2, 1955, p. 160-165.

Investigation of a few infra-red lines in the Kr spectrum with long-lived Kr^{85} isotope. Diagrams, tables. 12 ref.

12203* Retarded Electron Emission of Metals. **Die verzögerte Elektronenemission von Metallen.** (German.) Karlheinz Seeger. *Zeitschrift für Physik*, v. 141, nos. 1-2, 1955, p. 221-236.

Determination of above as function of time, temperature, potential of bombardment, and surface condition of W bombarded with electrons; count of retardedly emitted electrons with aid of secondary-electron multiplier. Diagrams, graphs. 31 ref.

Books and Miscellaneous Publications

12204 Neutron Diffraction. G. E. Bacon. Monographs on the Physics and Chemistry of Materials. 299 p. 1955. Oxford University Press, London. (QC721 B13n)

Experimental techniques. Investigations of magnetic materials and alloys.

12205 Pocket Encyclopedia of Atomic Energy. Frank Gaynor, editor. 204 p. 1950. Philosophical Library, New York. (QC772 G25p)

A comprehensive collection of brief definitions and explanations of terms and expressions of this field for the layman with an average education, and for the student with a working knowledge of physics and at least a nodding acquaintance with higher mathematics.

12206 Nuclear Physics. Irving Kaplan. A-W Series in Nuclear Science and Engineering. 609 p. 1955. Addison-Wesley Publishing Co., Cambridge, Mass. (QC173 K14m)

An elementary account of nuclear physics suitable as an introduction to this field. Presents an explanation of how our present knowledge of atoms and nuclei has been developed, and how some of this knowledge is applied.

12207 Framework for Atomic Industry. Herbert S. Marks and George F. Trowbridge. Sections individually paged. 1955. Bureau of National Affairs, Washington, D. C. (QC792 M34f)

Background of the law. Discussion of regulations concerning materials, patents, information, reactors, and licensing systems.

12208 Elementary Theory of Nuclear Shell Structure. Maria Goeppert Mayer and J. Hans D. Jensen. Structure of Matter Series. 269 p. 1955. John Wiley & Sons, New York. (QC173 M44.7e)

Stable and unstable nuclei; atomic structure and behavior; nuclear spectroscopy.

12209 Atomic and Nuclear Physics. Robert S. Shankland. 529 p. 1955. Macmillan Co., New York. (QC173 Sh18a)

Theories; particles; structures; spectra; radiation; isotopes.

12210 Beta- and Gamma-Ray Spectroscopy. Kai Siegbahn, editor. Series in Physics. 959 p. 1955. Interscience Publishers, New York. (QC173 Si15b)

Fundamentals; equipment; techniques; nuclear structures and characteristics.

See also:

11071 (effects of radiation on nucleic acids)
11073 (radiation effects on genes)
11115 (yttrim isotopes)
11249 (effect of radiation on acetic acid)
11281 (radiation decomposition of CO_2)
11505 (molecular radiation)
11557 (tracer chemistry in printing)
11948 (radiation effects on copper alloys)
12274 (interaction of β-particles with organic liquids)
12292 (polymerization by γ-rays)
12311 (radioactive fall-out)

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

12211 A Comparison of the Extinguishing Efficiencies of Bromochloromethane and Carbon Tetrachloride. E. H. Coleman and G. W. V. Stark. *Chemistry & Industry*, 1955, no. 20, May 14, p. 563.

Shows that shape of flammability limit curve and peak values are to be considered. Graph. 1 ref.

12212 Research Laboratory Design. R. M. Lodge. *Chemistry & Industry*, 1955, no. 21, May 21, p. 576-580.

Some general and special considerations in British design. Diagrams, photographs, plans.

12213 Merit Raises (or Recognition) at Battelle. Clyde E. Williams. Paper from EIGHTH ANNUAL CONFERENCE ON THE ADMINISTRATION OF RESEARCH, PROCEEDINGS. p. 25-28. 1954. (T58 C76p)

Policies of Battelle regarding merit raises for employees. A discussion of the many factors taken into consideration and the manner in which an employee is considered for merit raises.

12214 Human Relations in the Foundry Industry. Cal C. Chambers. *Foundry*, v. 83, July 1955, p. 122-124.

Condensation of a talk given before the American Foundryman's Society on the value of personal relationship between management and employees.

12215 Who Should Be Responsible for Quality Control? Kenneth M. Smith. *Foundry*, v. 83, July 1955, p. 125-127.

Suggestions on where responsibility for an effective quality control program should be placed in foundries of various size. Photograph.

12216 Experimental Planning for Rapid Determination of Optimum Process Conditions. W. A. Griffith. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, July 1955, p. 834-838.

Fractional replication of factorial design, a general method for planning experimentation, and for analysis of data obtained, is described as applied to a flotation investigation. Tables. 7 ref.

12217 Cultivating Our Science Talent—Key to Long-Term Security. Donald A. Quarles. *Scientific Monthly*, v. 80, June 1955, p. 352-355.

Stress on present Soviet accomplishments in technical education.

Operations Research and Management Engineering

Books and Miscellaneous Publications

12218 Motion and Time Study. Principles and Practice. Marvin E. Mundel. 2nd Ed. 575 p. 1955. Prentice-Hall, New York. (T60.T5 M92m2)

Human factors; process analysis; operation charts; application of standards.

12219 Motion and Time Study. Benjamin W. Niebel. 433 p. 1955. Richard D. Irwin, Inc., Homewood, Ill. (T60.T5 N55m)

Fundamental principles, are emphasized, providing an appreciation of and insight into the techniques used by industry in its motion, micromotion, and time studies, and wage payment plans.

12220 Coordination, Control, and Financing of Industrial Research. Albert H. Rubenstein, editor. 429 p. 1955. King's Crown Press, Columbia University, New York. (T175 C76p5)

Proceedings of the Fifth Annual Conference on Industrial Research with selected papers from the Fourth Conference. Operational criteria for the efficiency of research and development, and the possibility of developing methods for the satisfactory control of these operations and for stimulating scientific workers.

12221 Eighth Annual Conference on the Administration of Research, Proceedings, University Series, 108 p. 1954. New York University Press, New York. (T58 C76p)

A group of papers presented at the Eighth Annual Conference on the administration of research, dealing with appraising and rewarding the researchers output, management in the research laboratory, communication problems, physical facilities, and basic research in an applied research laboratory.

See also:

11333 (safety in the paint industry)

ORE AND MATERIALS BENEFICIATION

12222 Pelletizing of Iron Ore Concentrates. I. T. L. Joseph. *Blast Furnace and Steel Plant*, v. 43, June 1955, p. 641-646.

Reserves of iron ores, development of the pelletizing process and properties of pellets. Diagram, photograph, tables, graph. 14 ref. (To be continued.)

12223* Mechanism of the Interaction of Xanthates With the Surface of Sulfide Minerals. **K mekhanizmu vzaimodeistviia ksantogenatov s poverknost'iu sul'fidnykh mineralov.** (Russian.) I. N. Plaksin, S. V. Bessonov, and V. I. Tiurnikova. *Doklady Akademii Nauk SSSR*, v. 102, no. 2, May 11, 1955, p. 331-333.

Effect of O on the flotation of chalcopyrite (with quartz) in an A medium, with varying amounts of tagged ethyl potassium xanthate being introduced. Graphs. 2 ref.

12224 Removal of Sulphur During Iron-Ore Sintering. I. Laboratory Studies of the Kinetics of Sulphide and Sulphate Decomposition. V. Giedroyc. *Iron and Steel Institute, Journal*, v. 180, June 1955, p. 129-139.

Studies the mechanism by which pyritic and sulphate S is eliminated during sintering Fe ores and of factors affetcing the rate of S removal using synthetic sinter mixes. Graphs, tables. 23 ref.

12225 The Role of Iron-Ore Beneficiation. The Solution of the Taconite Problem in the U.S.A. William A. Haven. *Iron and Steel Institute, Journal*, v. 180, June 1955, p. 144-154 + 2 plates.

The increasingly important role of iron-ore beneficiation in the manufacture of pig iron and the development of new agglomerating processes that have helped to solve the taconite problem. Tables, diagrams, photographs, graph. 6 ref.

12226* Chemical-Metallurgical Properties of Poor Complex Iron Ores and the Best Methods for Their Complex Utilization. **Khimiko-metallurgicheskie svoistva bednykh kompleksnykh zheleznykh rud i ratsional'nye puti ikh kompleksnogo ispol'zovaniia.** (Russian.) D. P. Bogatskii and G. G. Urazov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 3, Mar., p. 108-121.

Describes so-called "oxidized" Fe-Ni ores from various formations in the Soviet Union. Graphs, diagram. 20 ref.

12227 Use of Autoclaves and Flash Heat Exchangers at Beaverlodge. R. W. Mancantelli and J. R. Woodward. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, June 1955, p. 751-755.

A method of concentrating the material by dissolving the U in Na_2CO_3, separating liquids from solids, and precipitating U from solution by NaOH. Photograph, diagrams. 4 ref.

12228* Pelletizing of Coarse Iron-Ore Fines and Slurries. **Durva vaséreporok és iszapok pelletezése.** (Hungarian.) László Visnyovszky and Tiborné Holló. *Kohászati Lapok*, v. 10, no. 5, May 1955, p. 201-210.

Process for utilizing the by-products of Al production. Laboratory experiments; pilot-plant process. Photographs, graphs, tables. 18 ref.

12229* The Problem of the Economy of Iron and Steel Production From Low-Grade Raw Materials. **Zur Frage der Wirtschaftlichkeit der Eisen-bzw. Stahlgewinnung aus geringwertigen Rohstoffen.** (German.) Reinhold Baake. *Metallurgie*, v. 5, no. 3, Mar. 1955, p. 77-82.

Factors to be considered in the economical smelting of low-grade iron ores. Tables. 4 ref.

12230* **Progress in Mineral Dressing.** F. B. Michell. *Mining Journal (Annual Review)*, 1955, May, p. 111 + 7 pages.

Developments in crushing classifying, and separating equipment. Photographs, diagram. 26 ref.

12231* **Salt Lake Tungsten Company's Custom Plant Treats Low Grade Concentrates to Produce Synthetic Scheelite.** Blair T. Burwell. *Mining World*, v. 17, June 1955, p. 44-49.

Objectional impurities; low-grade deposits; evolution of process; Salt Lake process; digest in pressure reactors; controls required; filtration; solution impurities; precipitation. Photographs, flowsheet.

12232* **Measuring the Crushing Resistance of Rocks and Ores.** Benjamin B. Burbank. *Pit and Quarry*, v. 47, June 1955, p. 102-106.

A practical method of rapidly obtaining the compressive strength, elastic properties, and approximate energy requirements for crushing rocks and ores. Graphs, photographs.

12233* Physical-Chemical Conditions for the Hydrometallurgical Recovery of Copper From Yugoslav Copper Ores. **Fizikalno kemijski pogoji za hidrometalurško pridobivanje bakra iz domačih bakrovih rud.** (Slovenian.) Krsto Cazafura and Boris Mejač. *Rudarsko-metalurški zbornik*, 1954, nos. 3-4, p. 191-217.

Chemical and mineralogical make-up of these ores. Chemical composition of flotation concentrates; oxidation-ammonia leaching of minerals and their flotation concentrates; effect of temperature and mixing speed on rate of reaction. Graphs, tables, photographs. 13 ref.

Books and Miscellaneous Publications

12234 Second International Coal Preparation Congress. (English.) Papers individually paged. 1954. Steinkohlenbergbauverein, Essen. (TN816 In8p)

Forty papers presented at meeting at Essen, Sept. 1954, on coal cleaning, crushing, and classifying. Methods and equipment.

PHYSICS

12235* The Location of Particles and Solutions in the Field of Standing Ultrasonic Waves. **Die Einstellung von Teilchen und Lösungen im Feld stehender Ultraschallwellen.** (German.) Gertrud Keck. *Acustica*, v. 5, no. 2, 1955, p. 131-134.

If heavy particles are suspended in a liquid before turning on the sound field they are driven to the pressure nodes. Diagram, photographs, tables. 4 ref.

12236* The Mechanical Input Impedances of Sound Pickups. **Die mechanischen Eingangsimpedanzen von Tonabnehmern.** (German.) R. Kaiser. *Acustica (Supplement)*, v. 5, no. 1, 1955, p. 81-92.

High mechanical input impedance is shown to be responsible for distortions in commercial crystal pickup. Graphs, diagrams, photographs. 10 ref.

12237* The Fading of Luminescence of Silver-Activated Zinc-Sulfide Phosphors After Excitation by Individual α-Particles and Electrons. **Das Abklingen der Lumineszenz silberaktivierter Zinksulfid-Phosphore nach Anregung durch einzelne α-Teilchen und Elektronen.** (German.) Dieter Smidt. *Annalen der Physik*, v. 15, nos. 5-6, 1955, p. 325-336.

Includes diagrams, oscillograms, graphs, table. 18 ref.

12238* Dynamic Measurements on Piezoelectric Vibrations With Very Large Electromechanical Coupling. **Dynamische Messungen an piezoelektrischen Schwingern mit sehr grosser elektromechanischer Kopplung.** (German.) Horst E. Müser and Heinz Bittel. *Archiv der elektrischen Übertragung*, v. 9, no. 5, May 1955, p. 231-236.

Includes diagrams, graphs, tables. 6 ref.

12239* Average Magnetic Susceptibility of Cobalt Oxide CoO and Solid Solutions 90 CoO-10 NiO and 91.7 CoO-8.3 CuO. **Susceptibilité magnétique moyenne de l'oxyde co-balteux CoO et des solutions solides 90 CoO-10 NiO et 91,7 CoO-8,3 CuO.** (French.) Henri Bizette and Belling Tsai. *Comptes rendus*, v. 240, no. 23, June 6, 1955, p. 2213-2215.

Includes graphs.

12240* Time T_2 in Nuclear Magnetic Resonance in Liquids. **Le temps T_2 en résonance magnétique nucléaire dans les liquides.** (French.) Yves Ayant. *Comptes rendus*, v. 240, no. 23, June 6, 1955, p. 2230-2232.

Application of the method of the quantum correlation function to the problem of enlarging the nuclear magnetic ray in a liquid, owing to the interaction of nuclear magnetic dipoles. 2 ref.

12241* Polarization of Electromagnetic Waves. **O poliarizatsii elektromagnitnykh voln.** (Russian.) F. I. Fedorov. *Doklady Akademii Nauk SSSR*, v. 102, no. 1, May 1, 1955, p. 69-71.

Vector analysis of the polarization of a flat monochromatic electromagnetic wave. 2 ref.

12242* Propagation of Disturbances in a Nonlinear-Elastic and Inelastic Medium. **Rasprostranenie vozmushchenii v nelineino-uprugoi i neuprugoi srede.** Kh. A. Rakhmatulin and G. S. Shapiro. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 2, Feb., p. 68-89.

Impact stressing causes elasto-plastic waves of deformation. Propagation of disturbances in a medium with a non-linear relation between stress and deformation; in elasto-plastic media; and in elasto-viscous, viscous-plastic, and elasto-viscous-plastic media. At high pressures considerably above the yield point for shear stress waves and at high rates of deformation, solids behave like gases. Graphs, diagrams, photographs. 77 ref.

12243* Measurements of the Parameters of Ferrite. **Ob izmereniiakh parametrov ferrita.** (Russian.) A. L. Mikaelian. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, 1955, no. 2, Feb., p. 137-139.

Review of various methods of calculating and measuring ferromagnetic resonance absorption and magnetic permeability. 11 ref.

12244 Charge Transfer Reactions in Monatomic and Diatomic Gases. J. A. Dillon, Jr., W. F. Sheridan, H. D. Edwards, and S. N. Ghosh. *Journal of Chemical Physics*, v. 23, May 1955, p. 776-779.

Charge transfer cross sections for symmetrical reactions increase with increasing viscosity cross sections, but decrease with increasing incident ion energy in conformity with the adiabatic criterion. Tables, graphs, diagrams. 17 ref.

12245* Luminescence of Fused Quartz Under Action of Ionizing Radiations. **Luminescence du quartz fondu sous l'action des radiations ionisantes.** (French.) M. Lautout. *Journal de chimie physique*, v. 52, no. 2, Feb. 1955, p. 169-175.

Action of X, γ, or α rays. Phenomenon of luminescence is considerably stronger in fused quartz than in crystalline. Diagrams, graphs. 16 ref.

12246* Emission Spectrum of Fused Quartz Irradiated by X-Rays. Role of Impurities and Vitreous State. **Spectre d'émission du quartz fondu irradié par les rayons X. Role des impuretés et de l'état vitreux.** (French.) M. Lautout. *Journal de chimie physique*, v. 52, no. 2, Feb. 1955, p. 176-178.

Dependence of phosphorescence on impurities and vitreous state. Tables, graph. 6 ref.

12247* The Principle of Continuity and the Quantum Theory. **Le principe de continuité et la théorie des quanta.** (French.) Alfred Landé. *Journal de physique et le radium*, v. 16, no. 5, May 1955, p. 353-357.

Systematic deduction of formal concepts and rules of the quantum theory from simple physical postulates.

12248* Fluorescence Spectroscopy Using X-Rays. **Fluoreszenzspektroskopie mit Röntgenstrahlen.** (German.) F. Regler. *Mikrochimica Acta*, 1955, nos. 2-3, p. 671-683.

Discusses current improvements in process; means of optical enlargement. Graphs, diagrams, photographs, spectrograms. 7 ref.

12249* Comparison Between the Transmission of Information in Optical and Wireless Systems. **Comparaison entre la transmission de l'information en optique et en radioélectricité.** (French.) André Blanc-Lapierre, Marcel Perrot, and Georges Péri. *Optica Acta*, v. 2, no. 1, Apr. 1955, p. 1-5.

Properties of transformations which express the behavior of different parts of an optical system are compared with those of R.F. circuit. Diagrams. 12 ref.

12250* Some Properties of Single Electrostatic Lenses, Whose Axis Potential Nearly Approaches the Cathode Potential. **Über einige Eigenschaften von elektrostatischen Einzellinsen, deren Achsenpotential fast das Kathodenpotential erreicht.** (German.) W. Lippert. *Optik*, v. 12, no. 4, 1955, p. 173-180.

Includes graphs. 7 ref.

12251* Flame Photometry With Directrix Calibration. **Flammenphotometrie mit Leitlinieneichung.** (German.) R. Herrmann. *Optik*, v. 12, no. 4, 1955, p. 189-195.

Includes table, diagram. 7 ref.

12252* A Dimensionless Characteristic Factor for the State of Flow of Solids. **Über eine dimensionslose Kennzahl für den Fliesszustand der festen Stoffe.** (German.) Th. Pöschl. *Österreichisches Ingenieur-Archiv*, v. 9, no. 1, 1955, p. 22-24.

When determining the factors which influence the state of flow of solids, the density must be excluded because the inertia forces in these materials vanish against the cohesive forces. Futhermore it is necessary to introduce the creep rate instead of the strain in Hooke's law. The "viscosity" of solids will then come out as a quantity of the same dimension as the viscosity of liquids. Graph.

12253* Entropy in Science and Technology. III. Examples and Applications. J. D. Fast. *Philips Technical Review*, v. 16, May 1955, p. 321-332.

Theory of specific heat of solids; thermodynamic equilibrium of certain lattice defects in solids and their relationship with diffusion phenomena; equilibria of mixtures, both in solid form and liquid solutions, including the extreme case of solutions of polymers. Graphs, diagrams. 4 ref.

12254 Magnetic Properties of Zinc Sulfide and Cadmium Sulfide Phosphors. Simon Larach and John Turkevich. *Physical Review*, v. 98, ser. 2, May 15, 1955, p. 1015-1019.

Purity, crystal modification, and synthesis procedures were carefully controlled, and the effect of charge-compensating-agents ("fluxes") and activators on the magnetic properties were determined. Diagram, tables, graphs. 29 ref.

12255 Electroluminescence. S. T. Henderson. *Research*, v. 8, June 1955, p. 219-235.

This phenomenon is exploited in the construction of a lamp whose uses are enumerated. Discussion of recent work on the subject and a description of the theory. Graphs. 40 ref.

12256* Determination of Isotopic Masses and Abundances by Mass Spectrometry. Alfred O. Nier. *Science*, v. 121, May 27, 1955, p. 737-744.

Describes the process, its operation and application. Tables, graphs, diagrams. 75 ref.

12257 Ultrasonic Welding of Aluminum. J. Byron Jones, Carmine F. De Prisco, and John G. Thomas. *U. S. Atomic Energy Commission, DP-107*, Feb. 1955, 48 p. (UF767 Un3.1dp)

Physics

Preliminary investigation to provide significant information relative to the merits of the process in fabricating ribbed Al components for heat exchange purposes, which would provide strength approximating parent metal, and withstand corrosion and thermal cycling. Graphs, tables, diagrams, photographs.

12258 The Pure Rotational Spectrum of Hydrogen Fluoride. D. F. Smith and A. H. Nielsen. *U. S. Atomic Energy Commission, K-1207,* Apr. 1955, 8 p. (UF767 Un3.1k)

Includes graphs, tables. 4 ref.

12259* Contribution to the Thermal Method of Ultrasonic Image Conversion. **Ein Beitrag zur Ultraschallbildwandlung auf thermischem Wege.** (German.) Herbert Tielsch and Alfred Boczek. *Zeitschrift für angewandte Physik,* v. 7, no. 5, May 1955, p. 213-218.

Utilization of thermal effect of ultrasound on image conversion; discussion of different groups of heat color, image-converter screen, and its uses in industry. Table, diagram, graph, photographs. 29 ref.

12260* Electroluminescence. **Elektrolumineszenz.** (German.) Albrecht Fischer. *Zeitschrift für angewandte Physik,* v. 7, no. 5, May 1955, p. 258-263.

Electroluminescence in *p-n* films and in alternating electrical fields; production of electroluminescent substances; explanation of the Destriau effect; electrophotoluminescence. Graphs, diagrams. 39 ref.

12261* A Comparison of the Luminescence of Calcium Silicate (Mn,Pb) and Zinc-Beryllium Silicate (Mn). **Ein Vergleich der Lumineszenz von Calciumsilikat (Mn,Pb) und Zinkberylliumsilikat (Mn).** (German.) Herbert Dziergwa and Horst Lange. *Zeitschrift für Physik,* v. 140, no. 4, 1955, p. 359-369.

Comparison of emission spectra in the visible range as a function of temperature and with consideration to the spectrally resolved afterglow. Graphs, tables. 18 ref.

12262* Nature of Thermoelectrical Phenomena. **O prirode termoelektricheskikh iavlenii.** (Russian.) A. G. Samoilovich. *Zhurnal Tekhnicheskoi Fiziki,* v. 25, no. 5, May 1955, p. 823-826.

Mathematical analysis and discussion of theories. Consideration of the irreversibility of thermal conductivity, difference of entropies of electrons, and chemical potentials of electrons in metals. 3 ref.

Books and Miscellaneous Publications

12263 Thermodynamics. John Francis Lee and Francis Weston Sears. Addison-Wesley Series in Mechanical Engineering. 543 p. 1955. Addison-Wesley Publishing Co., Cambridge, Mass. (QC311 L51t)

Fundamental concepts; mixtures; engines; refrigeration.

12264 Scientific Autobiography and Other Papers. Max Planck. (Translated from the German by Frank Gaynor.) 192 p. 1949. Philosophical Library, New York. (QC6 P69s)

Autobiographical notes, revealing Max Planck's own personal and scientific development, and four essays which constitute his last writings, dealing with the true and fictitious issues in science, the meaning and limit of exact science, physics and causality, and natural sciences and the religious world.

12265 The New Physics. C. V. Raman. 144 p. 1951. Philosophical Library, New York. (QC71 R14n)

A non-technical discussion of those parts of nature with which all of us come into contact, but which few of us attempt to understand: water, soil, weather, atmospheric electricity, the structure of crystals, and other topics. The section on physics is so written that it should give the lay reader an opportunity of penetrating at least part of the way into the mysteries of this interesting and important science.

12266 High Speed Aerodynamics and Jet Propulsion. v. I. Thermodynamics and Physics of Matter. Frederick D. Rossini, editor. 812 p. 1955. Princeton University Press, Princeton, N. J. (TL709 H53)

Author emphasizes the fundamental aspects of jet propulsion and high speed aerodynamics, developed the theoretical tools for attack on these problems, and sought to highlight the directions in which research may be potentially most fruitful.

12267 Magnetic Alloys and Ferrites. M. G. Say, editor. Electrical Engineering Progress Series. 200 p. 1954. George Newnes, London. (QC761 Sa98m)

An account of modern views on the fundamental processes of magnetization, including the domain theory. The related subjects of materials for magnetic recording and magnetostriction, together with magnetic compensating and non-magnetic alloying are included.

12268 Tensor Analysis for Physicists. J. A. Schouten. 2nd Ed. 277 p. 1954. Oxford University Press, London. (QA433 Sch68t2)

Space concepts; geometric considerations; dynamics; relativity.

12269 A History of the Theories of Aether and Electricity. Edmund T. Whittaker. **v. I. Rev. Ed. The Classical Theories.** 434 p. 1951. **v. II. The Modern Theories.** 319 p. 1953. Thomas Nelson and Sons, London. (QC177 W61h)

A comprehensive cover age of the history and development of the theories of aether, electricity, special relativity, quantum theory, general relativity, and matrix and wave mechanics from the age of Descartes to the year 1926.

12270 Transactions of Symposia in Applied Mathematics. v. II. 216 p. 1955. Interscience Publishers, New York. (QA85 Sy68t)

Recent advances in fields of operations research, statistics, computing, mechanics, and partial differential equations.

PLASTICS

12271* Use of Agricultural Residues as a Basis of the National Production of Plastics and Synthetic Chemical Products. **El aprovechamiento de los resíduous agrícolas como base de la producción nacional de plásticos y productos químicos de síntesis.** (Spanish.) Víctor de Buen Lozano. *Acero y energía,* v. 12, no. 68, Mar.-Apr. 1955, p. 41-57.

Discusses obtaining and use of furfural and its derivatives from agricultural residues rich in pentose. Diagrams, tables.

12272* Note on the Rheology of Polyacrylonitrile Solutions. (English.) Sven Sönnerskog. *Acta Chemica Scandinavica,* v. 9, no. 3, 1955, p. 535-537.

Explores difference between *azo* and *redox* activated products. Tables. 9 ref.

12273* Plastics in Aviation. E. A. Smith. *Aeronautics,* v. 32, June 1955, p. 60-61.

Summary of the use of plastics in aeronautical engineering. Table.

12274 The Interaction of β-Particles With Organic Liquids in the Presence of Vinyl Monomers. W. H. Seitzer and A. V. Tobolsky. *American Chemical Society, Journal,* v. 77, May 20, 1955, p. 2687-2692.

Chain initiation is related to rate of polymerization in terms of the average absorption coefficient for the β-particles. Tables, graphs. 10 ref.

12275 Studies on Polyvinyl Chloride. I. Reduction to a Hydrocarbon Polymer. John D. Cotman, Jr. *American Chemical Society, Journal,* v. 77, May 20, 1955, p. 2790-2793.

Reduced with $LiAlH_4$-LiH in tetrahydrofuran; similar to polyethylene. Table, infra-red spectra. 17 ref.

12276 On the Mechanism of the Acid-Catalyzed Rearrangement of Siloxane Linkages in Organopolysiloxanes. Dallas T. Hurd. *American Chemical Society, Journal,* v. 77, June 5, 1955, p. 2998-3001.

Silanol and group activity with strong H_2SO_4, HNO_3, and H halides. 11 ref.

12277 Optimistic Outlook for Plastic Valves. R. B. Seymour. *Chemical Engineering,* v. 62, June 1955, p. 280 + 6 pages.

Compares five thermosetting and seven thermoplastic materials. Table, photographs. 13 ref.

12278 Plastics for Chemical Engineering Construction. Polyethylene. Frank J. Bockhoff and Richard F. Roth. *Chemical Engineering Progress*, v. 51, June 1955, p. 251-256.

Examples of polyethylene in service and tabulated properties. Tables, photographs. 4 ref.

12279* Dye-Sensitized Photopolymerization of Vinyl Compounds. Polymerization of Styrene by Cyanine Dyes. I-II. (English.) Masao Koizumi and Ai Watanabe. *Chemical Society of Japan, Bulletin*, v. 28, no. 2, Mar. 1955, p. 136-146.

Direct interaction between excited dye and monomer strats polymerization. Tables, graphs, diagram, ultra-violet spectra. 7 ref.

12280 Plastics With Vision. *Chemical Week*, v. 76, June 4, 1955, p. 44.

Photosensitive polyvinyls are filled with fine Al_2O_3; require only heat to cure. Photograph.

12281 Filling in the Polyethylene Spectrum. *Chemical Week*, v. 76, June 4, 1955, p. 58, 60, 62.

Describes impact of low-pressure polyethylene on the current market. Table, graph.

12282 More Alike Than Different. *Chemical Week*, v. 77, July 9, 1955, p. 48, 50.

Compares Phillips process and Ziegler process low-pressure polyethylenes. Result: nearly identical products. Table.

12283 The Mechanism of Retardation in Thermal Polymerization Reactions. E. G. Edwards, G. F. P. Harris, and C. E. Seaman. *Chemistry & Industry*, 1955, no. 22, May 28, p. 625-626.

Effects of pyrogallol, *tert*-butylcatechol, catechol, and thymol on styrene polymerization. Graphs. 2 ref.

12284* Classification of Macromolecules of a High Polymer According to the Degree of Polymerization by the "Triangle" Method. **Sur le classement, suivant le degré de polymérisation, des macromolécules d'un haut polymère, par la méthode "en triangle".** (French.) Anne-Marie Meffroy-Biget. *Comptes rendus*, v. 240, no. 17, Apr. 25, 1955, p. 1707-1709.

Principles of the method and practical applications. Diagram. 9 ref.

12285 Reports to Technical Unit Committee T-1j on Oilfield Structural Plastics. I. Long-Term Creep of Pipe Extruded From Tenite Butyrate Plastic. II. Structural Behavior of Unplasticized Geon Polyvinyl Chloride. L. W. A. Meyer, R. J. Scogin, and G. F. Malone. *Corrosion*, v. 11, June 1955, p. 227-287.

Data are given of creep of extruded Tenite Butyrate pipe under internal pressure. The effects of temperature on the physical properties of Geon non-plasticized PVC and the effect of temperature on short term tensile properties are given. Photographs, graphs, tables. 1 ref.

12286* Polymerization of Methylated (in the Nucleus) Styrols. **Polimerizatsiia metilirovannykh (v iadre) stirolov.** (Russian.) M. M. Koton and T. G. Smoliuk. *Doklady Akademii Nauk SSSR*, v. 102, no. 2, May 11, 1955, p. 305-306.

Includes graphs. 12 ref.

12287 Investigation of Storage Battery Failure by a Method of Plastic Impregnation. A. C. Simon and E. L. Jones. *Electrochemical Society, Journal*, v. 102, June 1955, p. 279-284.

Electrolytic cells may be prepared for microscopic examination by replacement of the electrolyte with liquid epoxy resin, which later hardens and permits microscopic examination of the cell contents. Photographs, micrographs. 2 ref.

12288* Molded Plastics as Structural Parts. **Kunststoffe im Modellbau.** (German.) Carl Rauh. *Giesserei*, v. 42, no. 12, June 9, 1955, p. 310-312.

Methods of production, properties, and fields of application of molded phenol resins. Photographs, tables. 3 ref.

12289* Reaction of Epichlorhydrin and Glycidic Alcohol With Organochlorsilanes. **O reaktsii epikhlorgidrina i glitsidnogo spirta s organokhlorsilanami.** (Russian.) K. A. Andrianov, N. N. Sokolov, E. N. Khrustaleva, and L. N. Iukina. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1955, no. 3, May-June, p. 531-538.

Synthesis and properties of 12 compounds. Tables. 8 ref.

12290 Method of Integrating the Rate Equations for Free Radical Initiated Polymerizations. John P. Howe. *Journal of Chemical Physics*, v. 23, May 1955, p. 899-902.

Does not require assumption of steady states for free radical concentrations. Graph. 5 ref.

12291* Mechanical Birefringency of a Polyester. **Biréfringence mécanique d'un polyester.** (French.) Bernard Persoz and Jacques Bonnet. *Journal de chimie physique*, v. 52, no. 2, Feb. 1955, p. 157-161.

Study of birefringency changes in a specimen under constant elongation. Graphs. 2 ref.

12292* Polymerization of Methyl Methacrylate by γ-Rays. **Sur la polymérisation du méthacrylate de méthyle par les rayons γ.** (French.) Adolphe Chapiro and Eva Migirdicyan. *Journal de chimie physique*, v. 52, no. 5, May 1955, p. 439-440.

Presents results of study on radiochemical polymerization of methyl methacrylate in a large range of intensities of γ-rays (0.29 to 410 r). Graphs. 6 ref.

12293 Copolymerization of *Trans*-Methyl β-Benzoylacrylate. C. S. Marvel and Arjeh B. Galun. *Journal of Organic Chemistry*, v. 20, May 1955, p. 587-590.

Made tough rubber-like copolymers. Tables. 6 ref.

12294* The Crystal Structure of Polycaproamide: Nylon 6. D. R. Holmes, C. W. Bunn, and D. J. Smith. *Journal of Polymer Science*, v. 17, June 1955, p. 159-177.

Comparison of crystalline structure with nylon 66. Tables, diagrams, X-ray diffractograms. 16 ref.

12295* Bis-Type Modifiers in Polymerization. I. Behavior of Various Disulfides in Bulk Styrene Polymerization. R. M. Pierson, A. J. Costanza, and A. H. Weinstein. *Journal of Polymer Science*, v. 17, June 1955, p. 221-246.

Aryl disulfides have the higher transfer constants at 25, 50, and 75 C. Tables, graphs. 40 ref.

12296* On the Measurement of Polymerization Rates by Means of Infrared Absorption Spectra. Emil J. Slowinski, Jr. and George C. Claver. *Journal of Polymer Science*, v. 17, June 1955, p. 269-273.

Thermal polymerization of styrene at 100 C followed by infrared spectra. Graph, infra-red spectra. 5 ref.

12297* Acrylonitrile Polymerization in Homogeneous Solution. W. M. Thomas, E. H. Gleason, and J. J. Pellon. *Journal of Polymer Science*, v. 17, June 1955, p. 275-290.

Performed in purified dimethyl formamide. Tables, graphs. 14 ref.

12298* Thermomechanical Method for the Study of High Polymers. **Termomekhanicheskii metod izucheniia vysokopolimerov.** (Russian.) V. A. Kargin and M. N. Shteding. *Khimicheskaia Promyshlennost'*, 1955, no. 2, Mar., p. 74-79.

Relates deformation characteristics of amorphous and crystallizing polymers to temperature and mol. wt. Deformation curves of polyvinylchlorides, polyisobutylene, and polystyrene. Graphs. 7 ref.

12299* Fractional Precipitation of Polyamides. **Zur fraktionierten Fällung von Polyamiden. II.** The Distribution of the Lengths of Molecules in High-Molecular Fibers. **Die Molekülängenverteilung von hochpolymeren Faserstoffen.** (German.) J. Juilfs. *Kolloid-Zeitschrift*, v. 141, no. 2, Apr. 1955, p. 88-94.

Factors which determine molecular-length distribution in successive fractionations. Graphs, photograph. 8 ref.

12300* Identification and Reactions of End Groups in Polystyrene. **Nachweis und chemische Umsetzungen von Endgruppen in Polystyrolen.** (German.) W. Kern, M. A. Achon,

Plastics

and R. Schulz. *Makromolekulare Chemie*, v. 15, nos. 2-3, 1955, p. 161-169.

Bromobenzoic acid ester end groups, in the polymer mol. have been quantitatively hydrolyzed and identified by infra-red spectroscopy. Tables, infra-red spectra. 17 ref.

12301* Polyborylformals and Polyboric-Acid-Silyl Esters. **Über Polyborylformale und Polyborsäuresilylester.** (German.) F. A. Henglein, R. Lang, and K. Scheinost. *Makromolekulare Chemie*, v. 15, nos. 2-3, 1955, p. 177-187.

Made by trans-acetalization or trans-esterification. Tables. 11 ref.

12302 Epoxy-Furane Blends. W. Brenner and E. J. Singer. *Materials & Methods*, v. 41, June 1955, p. 102-104.

Comparison of costs and properties of epoxy-furane blends and straight epoxies. Tables, photographs.

12303 A New Type of Copolymer. D. A. Barr and R. N. Haszeldine. *Nature*, v. 175, June 4, 1955, p. 991-992.

An insoluble, non-reactive oil from a 1:1 mix of trifluorontrosomethane and tetrafluoroethylene. 2 ref.

12304 Glass Fibre Reinforced Plastics for Press Tools, Jigs and Patterns. A. M. Dobson. *Sheet Metal Industries*, v. 32, no. 338, June 1955, p. 410-414; disc., p. 420-424.

Properties that make this material suitable for use in press tools. Diagrams, photographs, table.

12305 The Development of Plastic Tools With Particular Reference to the Use of Polyester Resins. J. T. Maddison. *Sheet Metal Industries*, v. 32, no. 338, June 1955, p. 415-420; disc., p. 420-424.

Basic properties and methods of handling the recently developed polyester resins and in particular their use for producing matching press tools. Graphs, diagrams, tables.

12306* Thermodynamic Investigations of the Relations Between Glassy, Molten, and Dissolved Polystyrene. **Thermodynamische Untersuchung der Beziehungen zwischen Glas, Schmelze und Lösung bei Polystyrolen.** (German.) G. V. Schulz, K. V. Günner, and H. Gerrens. *Zeitschrift für physikalische Chemie (Frankfurt)*, v. 4, nos. 3-4, June 1955, p. 192-211.

Preparation and determination of specific volumes, pycnometric densities, enthalpies, and entropies of polystyrene in the solid, molten, and dissolved state. Tables, graphs. 22 ref.

12307* Investigation of the Relaxation Processes in Polyvinyl Acetate at Temperatures Below the Softening Temperature. **Issledovanie relaksatsionnykh protsessov v polivinilatsetate pri temperaturakh nizhe temperatury razmiagcheniia.** (Russian.) L. F. Veselovskii and A. I. Slutsker. *Zhurnal Tekhnicheskoi Fiziki*, v. 25, no. 5, May 1955, p. 939-942.

Experimental investigations of the dielectric properties of a polar polymer. Measurements carried out for a temperature range of −150 to + 20 C and a frequency range of 50 to 10^{10} cycles. Graphs. 6 ref.

See also:

11601 (polymerization of methacrylates)
11607 (wear resistance of steel)
12074 (plastic tooling standards)
12323 (plastic foam uses)
12415 (welding of thermoplastics)

POLLUTION AND WASTES

12308 Corrosion Aspects of Air Pollution. Leonard Greenburg and Morris B. Jacobs. *American Paint Journal*, v. 39, July 11, 1954, p. 64 + 7 pages.

Classification of atmospheres and their active corrosive agents; types of materials affected and their relative degree of resistance; effects of climatic conditions; bacterial deterioration. Tables. 15 ref.

12309 Analytical Methods and Instrumentation in Air Pollution. *Analytical Chemistry*, v. 27, May 1955, p. 692-716.

A joint symposium of five papers presented at the American Chemical Society Meeting, New York, N. Y. in Sept. 1954. Covers light scattering in aerosols, H_2SO_4 aerosol, identification (micro-) of air-borne pollutants, transmissometer and visibility in air pollution; water traps and greased plates for dustfalls. Tables, graphs, diagrams, photographs, micrographs. 72 ref.

12310 Identification of Petroleum Refinery Wastes in Surface Waters. A. A. Rosen and F. M. Middleton. *Analytical Chemistry*, v. 27, May 1955, p. 790-794.

Wastes, concentrated with active C, were fractionated and compared with known wastes by infra-red spectrography. Infra-red spectra. 19 ref.

12311 Radioactive Fall-Out. III. Ralph E. Lapp. *Bulletin of the Atomic Scientists*, v. 11, June 1955, p. 206-209, 230.

Explains previous calculations, emphasizes persistence of radioactive fall-out, and outlines problems involved in internal hazards from fission products. Tables, graph.

12312 Electrolytic Treatment of Waste Sulfate Pickle Liquor Using Anion Exchange Membranes. C. Horner, A. C. Winger, G. W. Bodamer, and R. Kunn. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1121-1129.

New process, using Amberplex membrane, permits recovery of electrolytic iron and the regeneration of sulfuric acid, thus eliminating the disposal problems. Graphs, diagrams.

12313 Atmospheric Pollution. Louis C. McCabe. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 101A-102A, 104A.

Describes establishment of pollution levels in Los Angeles County. Tables, photograph. 8 ref.

12314 Air Pollution—The Growth of Public Opinion. Hugh E. C. Beaver. *Mechanical Engineering*, v. 77, June 1955, p. 508-510.

Problems of air pollution and the growth of public opinion in England.

RUBBER AND ELASTOMERS

12315 Alkyl Amates as Plasticizers of Elastomers. Arthur William Campbell. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1213-1216.

Economics only restrict the use of amates in natural and synthetic rubber and PVC. Tables. 4 ref.

12316 Combination of Rubber and Carbon Black on Cold Milling. W. F. Watson. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1281-1286.

Demonstrates the chemical association involved. Tables, graphs. 7 ref.

12317 Effect of Heat Treatment on Reinforcing Properties of Carbon Black. W. D. Schaeffer and W. R. Smith. *Industrial and Engineering Chemistry*, v. 47, June 1955, p. 1286-1290.

Carbon black heated to 1500 F, improves rubber and reduces modulus. Tables, graphs. 11 ref.

12318* Problems of the Physical Testing of Vulcanizates. **Probleme der physikalischen Prüfung von Vulkanisaten.** (German.) Primus Kainradl. *Kautschuk und Gummi*, v. 8, no. 5, May 1955, p. 117WT-124WT.

Review of methods for testing the physical properties of vulcanized rubber. Graphs, diagrams, tables. 27 ref. (To be continued.)

12319* Special Types of Latex Foam. **Besondere Latex-Schaumsorten.** (German.) J. W. F. van't Wout and A. J. de Vries. *Kautschuk und Gummi*, v. 8, no. 5, May 1955, p. 130WT-134WT.

Effect of fillers on properties and price. Graphs, tables. 8 ref.

12320* Phase-Contrast Microscopy of Natural Rubber Latices. **Phasenkontrast-Mikroskopie natürlicher Kautschuk-Latices.** (German.) Th. G. F. Schoon. *Kolloid-Zeitschrift*, v. 141, no. 2, Apr. 1955, p. 82-87.

Study of colloidal particles of different rubber plants at 1000-2000 magnification. Micrographs. 17 ref.

12321* **Fine Silica Particles as a Compounding Agent for Rubber. II. Latex Coprecipitated Silica.** (English.) Yujiro Oka and Hajime Kobayashi. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 50, no. 4, Apr. 1955, p. 140-148.

Raw rubber mixed with coprecipitate and vulcanized, is highly reinforced. Tables, graphs. 4 ref.

12322 A Study of GR-S Faceblank Compounds. H. A. Winkelmann and M. P. Marks. *Rubber Age*, v. 77, May 1955, p. 233-246.

Rubber compositions for gas masks. Tables, graphs, photographs.

12323 Rubber and Plastic Foams. *Rubber Age*, v. 77, May 1955, p. 247-254.

A joint panel presentation of seven papers by the Akron Rubber Group and the Cleveland-Akron Section of the SPE. Covers latex, PVC, isocyanate, polystyrene, phenolic resin foams, and sponges; their use in furniture and autos. (To be continued.)

12324 Data on Commercially Available GR-S Type Synthetic Rubber Polymers. *Rubber Age*, v. 77, June 1955, p. 422-423.

Tabulated data, with prices on 47 different types.

See also:

12371 (rubber-base adhesives)

SPACE HEATING AND CONDITIONING

12325* **The Dual-Purpose Domestic Heat Pump.** G. O. McLean. *Institute of Fuel, Journal*, v. 28, May 1955, p. 224-228.

Outlines the principles involved, gives consideration to heat-balance requirements, and deals with the size and type of control needed, installation and operational problems, the economics and future applications of this type of machine. Graphs. 9 ref.

12326* **The Injection Refrigeration Cycle.** Willis Merle Carter. *Refrigerating Engineering*, v. 63, June 1955, p. 38 + 8 pages.

Experimental results with a special rotary compressor adapted for the injection refrigerating cycle indicates that practical performance gains are possible. A proposed adaption for commercial compressors is presented. Graphs, diagrams, table. 5 ref.

Books and Miscellaneous Publications

12327 Heating, Ventilating, and Air Conditioning Guide. v. XXXIII. 1955. 1680 p. American Society of Heating and Air-Conditioning Engineers, New York. (TH7222 H35)

Comprehensive review of fundamentals, human reactions, systems, and equipment.

TEXTILES AND FIBERS

12328 Stress-Strain Relationships in Yarns Subjected to Rapid Impact Loading. I. Equipment, Testing Procedure, and Typical Results. II. Breaking Velocities, Strain Energies, and Theory Neglecting Wave Propagation. Walter K. Stone, Herbert F. Schriefer, George Fox, Frank L. McCrackin, and Jack C. Smith. *Journal of Research, National Bureau of Standards*, v. 54, May 1955, p. 269-280.

Behavior at rates of 100,000 to 1,000,000% per min. Such demands are made in safety equipment, ropes, and parachute rigging. Graphs, diagrams, photographs. 43 ref.

12329* **Dyes Containing 1,3,5-Triazine Ring. Syntheses of Green Direct Cotton Dyes and Their Properties. II. Effects of Triazine Ring to Direct Cotton Dye. III. Large Molecular Direct Cotton Dyes.** (English.) Hirotada Iida. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 50, no. 4, Apr. 1955, p. 113-124.

Includes tables, graphs, ultra-violet spectra. 15 ref.

12330* **The Effect of Chlorine on Dyed Nylon.** A. N. Davidson and R. Preston. *Society of Dyers and Colourists, Journal*, v. 71, May 1955, p. 235-243.

Data for a representative selection of dyes before and after dry chlorination. Tables, graphs. 9 ref.

12331* **Crease Recovery of Fabrics. I. Some Tensile Properties of Wool, Vicara, and Rayon Fibers and Their Relationship to Fabric Crease Recovery. II. Effect of Construction on Crease Recovery of Fortisan Fabrics.** J. F. Krasny, Arnold M. Sookne, G. D. Mallory, J. K. Phillips. *Textile Research Journal*, v. 25, June 1955, p. 493-506.

Materials; test methods; results. Graphs, tables. 18 ref.

Books and Miscellaneous Publications

12332 Shirley Institute Memoirs. v. XXVII. 331 p. 1954. Shirley Institute, Manchester. (TS1300 Sh66rn)

Sixteen papers on pressure tests, drafting forces, torsional rigidity, frictional forces, and various other tests and processes in the textile industry.

WELDING AND JOINING

12333 Structural Spotwelding. William R. Cain. *Aircraft Production*, v. 17, June 1955, p. 242-247.

Applications in airframe manufacture to large fuselage skin-panels and floor-structure. Graphs, photographs, table, diagrams. 3 ref.

12334* Arc Welding of Aluminum Under the Protection of Inert Gases. **Die Lichtbogenschweissung von Leichtmetallen unter Edelgasschutz.** (German.) W. Mantel and L. Wolff. *Aluminium*, v. 31, no. 6, June 1955, p. 255-259.

"Argonarc" and "Sigma" welding. Description; optimum conditions, and economy of the method. Graphs, micrographs. 4 ref.

12335* A New Method of Flash-Butt Welding of Aluminum Alloys. **Neue Verfahren der Abbrennschweissung von Aluminiumlegierungen.** (German.) A. Klopfert. *Aluminium*, v. 31, no. 6, June 1955, p. 260-266.

A detailed description of the method, with special reference to its effects on the design and properties of the manufactured components. Diagrams, photographs, tables. 1 ref.

12336* Application of Modern Welding Techniques in Construction of Hoisting Equipment Made of Aluminum Alloy. **Anwendung der modernen Schweisstechnik bei einem Hebezeugaus Aluminiumlegierungen.** (German.) J. Weisgerber and Puschner. *Aluminium*, v. 31, no. 6, June 1955, p. 266-270.

Structural design of the welded joint; method of arc welding; composition of the alloy. Photographs, diagrams, micrographs. 1 ref.

12337* Hatch Beams of Aluminum-Alloys (AlMgSi). **Aluminium-Schiebebalken (AlMgSi).** (German.) A. Szymanski. *Aluminium*, v. 31, no. 6, June 1955, p. 271-274.

Machine arc-welding of Al-Mg-Si alloy. Welding joints; method and machine used. Diagrams, photographs, graphs, table. 3 ref.

12338* Investigation of Adhesive Bonding of Metals. **Untersuchungen und Studien zum Metallkleben.** (German.) G. Kaliske. *Aluminium*, v. 31, no. 6, June 1955, p. 275-281.

Comprehensive survey of present status. Influence of a series of factors such as thickness of joined parts, method of joining, and material, on the strength of the bonded joint. Adhesive materials. Graphs, photographs. 20 ref.

12339 Report of Committee D-11 on Rubber and Rubber-Like Materials. *American Society for Testing Materials, Preprint No.* 44, 1955, 18 p. (TA401 Am35p)

Tentative specifications for ozone resistant rubber insulating tape; and proposed revision of tentative test methods for adhesion of vulcanized rubber to metal, and of testing hard rubber products. Table, diagrams, photographs.

12340 Ferrous Welding Metallurgy With Special Reference to the Welding of Cold-Bent Steel. H. O'Neill. *British Welding Journal*, v. 2, June 1955, p. 241-246.

Welding of steels and cast iron with reference to grain size effects; principles underlying the selection of elements for high-tensile weldable steels; details of strain aging and cracking effects in the welding of cold bent steels. Micrographs, photographs, table. 20 ref.

Welding and Joining

12341 Failure of a Large Welded Oil-Storage Tank. *British Welding Journal*, v. 2, June 1955, p. 254-263.

The failure was of the "brittle fracture" type. Studies of analyses, mechanical properties, micro-structures, and erection procedures. Diagrams, photographs, tables, graphs.

12342 Usefulness of Continuous-Cooling TTT Diagrams for Special Problems With High-Strength Weldable Steels. F. Nehl and A. Rose. *Henry Brutcher Translation No.* 3476, 22 p. (From *Stahl und Eisen*, v. 74, 1954, p. 1054-1062.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 17955, v. 3, Dec. 1954.

12343 Submerged Automatic Arc Welding of Nickel-Chromium Alloys. F. S. Bugrii. *Henry Brutcher Translation No.* 3495, 4 p. (From *Vestnik Mashinostroeniya*, v. 34, no. 8, 1954, p. 85-86.) Henry Brutcher, Altadena, Calif.

Specific effects of C and S in alloys upon results of welding experiments; corrosion resistance of specimens; quality of welds obtained. Tables, photographs.

12344 The Sigma Phase in 18-8 Austenitic Steel Welds. B. I. Medovar and A. A. Rossoshinskii. *Henry Brutcher Translation No.* 3516, 16 p. (Abridged from *Avtomaticheskaya Svarka*, v. 7, no. 3, 1954, p. 26-40.) Henry Brutcher, Altadena, Calif.

Paper deals with the conditions for formation, and the methods of rendering visible brittle structural constituents, known as the σ-phase, in automatic welds made with chrome-nickel austenitic steel filler metal. Tables, graphs, photograph, micrographs. 17 ref.

12345 Resistance Welding of High Temperature Alloys. P. M. Howard and D. Wilcox. *Canadian Metals*, v. 18, June 1955, p. 58-62.

Principles, effect of material properties, welding of high temperature alloys, and dissimilar metals, cleaning, and quality control are discussed. Table, photographs, diagrams.

12346 Some Interesting Welding Investigations. I. W. P. Campbell and M. J. Nolan. *Canadian Metals*, v. 18, July 1955, p. 42-45.

Investigations shows the result of failure to observe some detail of welding procedure or technique, or possibly, a misapplication of welding. Photographs, micrographs. (To be continued.)

12347* Automatic Arc Welding. **La soldadura automatica por arco.** (Spanish.) Evert H. Bylin. *Ciencia y técnica de la Soldadura*, v. 5, no. 23, Mar.-Apr. 1955, 6 p.

Study of the problem of continuity of coated electrodes in automatic arc welding. Diagrams, photographs.

12348* Problem of Weldability in Resistance Welding. **El problema de la soldabilidab en la soldadura por resistencia.** (Spanish.) C. Penche Felgueroso. *Ciencia y técnica de la Soldadura*, v. 5, no. 23, Mar.-Apr. 1955, 10 p.

Study of transformations taking place in difficult weldable materials during electric resistance welding according to different processes. Graphs, diagrams, micrographs. 7 ref.

12349* Spot Welding of High-Strength Steels. Methods for Determining the Regulation of Resistance-Welding Machines. Presentation of a Regulation Diagram. **Soldadura por puntos de aceros de gran resistencia. Metodo para determinar la regulacion de las maquinas de soldar por resistencia. Presentacion de un abaco de regulacion.** (Spanish.) P. Joumat. *Ciencia y técnica de la Soldadura*, v. 5, no. 23, Mar.-Apr. 1955, 4 p.

Principle of spot-welding method; describes use of regulation diagram.

12350 The Welding of Aluminium and Its Alloys. J. F. Lancaster. *Engineers' Digest*, v. 16, May 1955, p. 227-232.

Research progress, welding in production, jigs and fixtures, weld defects, and recent developments are discussed. Photographs, graphs, table. 13 ref.

12351 Joining Aluminium by Soft Soldering. H. C. Watkins. *Engineers' Digest*, v. 16, May 1955, p. 233-236.

Soldering techniques, solder composition, base alloy composition, and applications of Al soldering are described. Photographs. 12 ref.

12352 Production Brazing of Aluminum-Sheathed Heating Elements. Charles A. McFadden. *Industrial Heating*, v. 22, June 1955, p. 1138 + 6 pages.

Semi-automatic brazing machine has timer for automatically throttling the burners after brazing alloy has flowed into joint. Photographs.

12353* Carbon Dioxide—Will It Replace Argon and Helium for Inert Arc Welding? *Industry & Welding*, v. 28, June 1955, p. 59-61, 94.

Cost comparisons and the use of CO_2 in conjunction with A. Photograph, diagram.

12354* Titanium Can Be Brazed and Soldered. Orville T. Barnett. *Industry & Welding*, v. 28, June 1955, p. 62-66.

Methods of brazing and soldering; fluxes; heating time and temperatures. Photographs, tables.

12355* How and Where to Use Spot Welding. *Industry & Welding*, v. 28, June 1955, p. 71-74, 76.

Comprehensive practical information on spot welding. Includes step by step instructions. Diagrams.

12356* The DC Rectifier Arc Welder. *Industry & Welding*, v. 28, June 1955, p. 86 + 5 pages.

Design features, ripple effect, applications, and economy.

12357* Automatic Brazing in Molten Salt? *Industry & Welding*, v. 28, July 1955, p. 46-48, 50.

Parts assembled with brazing alloy in place are immersed in molten salt. As soon as immersed joint has reached bath temperature—a matter of sec.—it is removed, quickly quenched or slowly cooled in air as required. Photographs, diagram.

12358* How to Use Pulsation Spot Welding. *Industry & Welding*, v. 28, July 1955, p. 59-60, 62.

How to determine timing, tip diameters, pressures, and secondary currents. Using this method in welding Cr-Mo steels doubled the tensile strength of welds. Diagram.

12359 New Resistance Welder Fabricates Wide Wire Mesh at High Speed. *Iron Age*, v. 175, June 2, 1955, p. 100-101.

Resistance welding machine produces wire mesh in widths up to 13 ft. from continuous coils of 4 to 14-gage wire. Photographs.

12360 New Welding Process Deposits Metal Faster. *Iron Age*, v. 175, June 16, 1955, p. 90-91.

Development of an automatic submerged-arc welding process which deposits metal up to five times as fast as comparable welding methods and at half the power cost. Photographs.

12361 Welding, Brazing, Joining—1855 to 1955. *Iron Age (100th Anniversary Issue)*, v. 175, June 1955, p. 2L-16L.

Historical review of developments in methods and equipment. Future possibilities. Photographs.

12362* The Effects of Contact Resistance Upon Spot Welding. (English.) Isamu Ukita and Tatsuya Hashimoto. *Kyoto University, Engineering Research Institute Technical Reports*, v. 5, no. 3, Mar. 1955, p. 53-73.

Theoretical and experimental examination of the effects of contact resistance on the properties of weld such as shear strength, temperature distribution, and growth of the weld. Photographs, graphs, diagrams, tables. 4 ref.

12363 New Techniques for Spotwelding Aluminum. William R. Gain. *Light Metal Age*, v. 13, June 1955, p. 19 + 5 pages.

Optimum values obtained for spot spacing, edge margin, row spacing, and single spot shear strength to satisfy the requirements of ultimate tensile strength and joint fracture in aeronautical welding.

12364 Weldability of Stainless Steel. Helmut Thielsch. *Machine Design*, v. 27, June 1955, p. 157-164.

A design guide to alloy selection, electrode and rod specification, and heat-treatment procedures. Photographs, tables, micrograph.

12365 Weldability of Cast Steels. Helmut Thielsch. *Machine Design*, v. 27, July 1955, p. 167-171.

Design recommendations for welding procedures, electrode specifications, and heat-treatment methods for cast C and low-alloy steels. Table, photographs.

12366 Convair Procedure in Quality Welding. Fred Monahan. *Machinery*, v. 61, June 1955, p. 200-203.

A welding procedure that covers the engineering of steel weldments, planning of welding operations, design of tooling, material procurement and inspection, heat-treatment, and other phases of the process. Photographs.

12367 The Production of Continuous Rail-Lengths by Flash Butt Welding. *Machinery (London)*, v. 86, June 3, 1955, p. 1188-1191.

Some advantages of this method include reduced track maintenance and tire wear on rolling stock, quieter and smoother running, and reduced arcing and consequent burning of moving contacts in electrified systems. Photographs.

12368 Welding Titanium Without Filler Rod. Alan V. Levy and Robert Wickham. *Materials & Methods*, v. 41, June 1955, p. 116-118.

Recent experience with "no-rod-added" welds reveal improved joint ductility and results in less grinding. Technique may be extended to Ti alloys. Photographs.

12369 30° Pipe Bevel Best for Pipelines. L. J. Cunningham and S. V. Williams. *Oil and Gas Journal*, v. 54, May 30, 1955, p. 70-73.

Compared with recently revised A.P.I. Standards, which call for a 37½° bevel, the smaller the bevel proves to be a better weld, requiring less welding time, and results in greater savings. Micrographs, photographs, diagrams.

12370* Flash Butt-Welding for Rails. *Railway Track and Structures*, v. 51, June 1955, p. 34-38.

Process developed in Europe now adapted for use in this country is currently producing continuous rails on the Santa Fe. Photographs, diagram.

12371 Some Recent Applications of Rubber-Base Adhesives. J. M. McClellan. *Rubber Age*, v. 77, June 1955, p. 385-390.

Types of adhesives and testing; applications are illustrated. Table, graphs, diagrams, photographs.

12372* The Development of Sigma-Welding and Its Application to Carbon Steels. **Die Entwicklung des SIGMA-Verfahrens und dessen Fortschritte beim Schweissen von Kohlenstoffstählen.** (German.) H. E. Rockefeller and Peter R. R. Scarr. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 11-15.

Technical development of inert-gas welding with W electrode and with consumable electrode; stability and control of arc in sigma welding; problems and present procedures of welding C steels. Photographs, graphs, tables.

12373* Modern Evaluation of Welding in the Design of Boilers and Tanks. **Die moderne Bewertung der Schweissung im Kessel- und Behälterbau.** (German.) W. P. Kerkhof. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 66-69.

Stresses in pressure vessels at normal and elevated temperatures; effect of annealing, stresses at base of notch or crack, and plate thickness on strength of weld joints; importance of preheating and subsequent heat treatment. Graphs.

12374* Correct and Incorrect Application of Electric-Arc Welding. **Richtige und falsche Durchführung der Lichtbogenschweissung.** (German.) M. Komers, Denis, S. Förster, E. Kauhausen, H. Neumann, H. Schmidt-Bach, E. Sudasch, R. Thoma, and Mennen. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 79-88.

Proper choice of electrodes, amperage, and source of current; correct handling of the different types of electrodes; preparation of weld joints; good welding practice; auxiliary equipment; principles of automatic protective-gas and repair welding. Graphs, photographs, diagrams.

12375* Resistance Welding of Thin Profiles of Large Cross Section. **Widerstandsschweissen von dünnen Profilen mit grossem Querschnitt.** (German.) K. Seyderhelm. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 101-105.

Effect of current distribution, total current, and heat losses of variable wall thicknesses on quality of the weld; effect of the welding process on structure. Diagrams, graphs, photograph, micrographs. 27 ref.

12376* Possibilities and Limitations of Gluing Metals. **Möglichkeiten und Grenzen der Metallklebtechnik.** (German.) Ernst Rubo. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 106-116.

Techniques of joining metals to metals and metals to non-metals with hardenable synthetic resins; the various advantages of the process; mechanical testing and strength properties of glued joints. Diagrams, photographs, tables, graph. 19 ref.

12377* The Present Status of the Thermit Welding Process. **Der derzeitige Stand der aluminothermischen Schweissung.** (German.) Wilhelm Ahlert. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 116-124.

Metallurgical principles; proper and improper procedure; effect of heat treatment on properties of Thermit welds; practical examples. Photographs, graphs, micrographs, table.

12378* The Behavior of Corrosion-Resistant Chromium-Nickel Steels Towards Welding. **Das Verhalten korrosionsbeständiger Cr-Ni-Stähle beim Schweissen.** (German.) F. Rapatz. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 128-133.

Methods of testing Cr-Ni steels for susceptibility to intercrystalline corrosion and hot shortness; method of detecting and avoiding stress-crack corrosion; effects of C content and heat treatment. Photographs, micrographs, tables, graphs.

12379* Sigma-Welding and Its Application, Especially in the Processing of Steels. **Die Sigma-Schweissung und ihre Anwendung, insbesondere für die Verarbeitung von Stählen.** (German.) Lothar Wolff. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 134-140.

Principle and basic requirements for sigma-welding; control of wire feed; difficulties of welding soft and unsilicized C steels; type and voltage of electric current; composition of welding rod; surface condition of the material; properties of sigma welds, and economy of the process. Photographs, tables, graphs, diagrams. 3 ref.

12380* Problems of Soldering and Brazing. **Probleme der Löttechnik. II.** (German.) J. Colbus. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 140-147.

Definition of terms; temperature measurement; strength properties of soldered joints; effects of fluxes with and without wetting agents. Diagrams, photographs, graphs, tables. 11 ref.

12381* The Present Status of Rail Welding. **Der derzeitige technische Stand des Schweissens von Schienenstössen.** (German.) M. de Miro-Ramonacho. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 148-158.

Advantages and objections to continuous rails; critical evaluation of different methods of welding and laying rails; modern practice of rail welding in different countries. Graphs. 169 ref.

12382* Stud Welding. **Bolzenschweissen.** (German.) K. L. Zeyen. *Schweissen und Schneiden*, v. 6, special no. 1954, p. 159-167.

Principle of stud welding; special characteristics of "Cyc-Arc" and "Nelson" processes and their advantages. Photographs, table, diagrams. 10 ref.

12383* The Electric Weld Arc and Its Importance to Electrical High-Temperature Processes. **Der Schweisslichtbogen in seiner Bedeutung für die elektrischen Hochtemperaturverfahren.** (German.) Johannes Wotschke. *Schweissen und Schneiden*, v. 6, special no., 1954, p. 168-173.

Welding and Joining

Actions of the electric arc and its energies in welding, smelting, and melting. Diagrams, graphs. 7 ref.

12384* Practical Measures Against Shrinking Effects on Welded Constructions From the Standpoint of Economy. **Praktische Massnahmen gegen Schrumpfwirkungen an Schweisskonstruktionen im Spiegel der Wirtschaftlichkeit.** (German.) Richard Malisius. *Schweissen und Schneiden*, v. 7, no. 4, Apr. 1955, p. 119-133.

Proposals to the welding engineer for the control of shrinkage stresses and deformations. Photographs, diagrams, graphs, table. 6 ref.

12385* Design and Operation of a Portal-Type Projection Welding Machine. **Aufbau und Wirkungsweise einer Portal-Buckelschweissanlage.** (German.) R. Schmarz. *Schweissen und Schneiden*, v. 7, no. 4, Apr. 1955, p. 136-140.

Scope of problems and design data—welding machine—ignitron control—preparation of workpieces. Diagrams, photographs, table.

12386* Investigations on the Melting Rate of Manual Arc Welding Electrodes. **Studie über Abschmelzleistung von Schweisselektroden für die Lichtbogenschweissung.** (German.) H. Frankenbusch. *Schweissen und Schneiden*, v. 7, no. 4, Apr. 1955, p. 140-143.

Melting rate expressed in kg. per hr. as the most suitable index for electrode performance; investigation of factors which affect electrode-melting rate. Photograph, graphs, table. 14 ref.

12387* Development and Present Situation in Gas-Welding of Rails. **Entwicklung und heutiger Stand der autogenen Schienenschweissung.** (German.) F. Fries. *Schweissen und Schneiden*, v. 7, no. 4, Apr. 1955, p. 144-151.

Compositions of rail steels; effect of melting method on weldability; strength properties of weld joints; importance of and factors to be considered in deposition welding for repair. Tables, photographs, diagrams. 18 ref.

12388* Considerations on Failures of Welded American Ships. **Betrachtungen zu den Schadensfällen an geschweissten amerikanischen Handelsschiffen.** (German.) H. Dohrmann. *Schweissen und Schneiden*, v. 7, no. 4, Apr. 1955, p. 151-158.

Variable effect of riveting and welding on susceptibility to failures. Difference in internal stresses between riveting and welding as constructional element. Diagrams, photographs. 4 ref.

12389* Development and Present Status of Autogenous Rail Welding. **Entwicklung und heutiger Stand der autogenen Schienenschweissung.** (German.) F. Fries. *Schweissen und Schneiden*, v. 7, no. 5, May 1955, p. 190-198.

Methods of joining straight rails, rail crossings, and switches. Diagrams, photographs. 4 ref.

12390* Advances in the Field of Welding and Cutting. **Fortschritte auf dem Gebiete des Schweissens und Schneidens.** (German.) K. K. Zeyen. *Schweissen und Schneiden*, v. 7, no. 5, May 1955, p. 200-207.

Review of literature on the effect of H on weld cracking, and the quality of weld seams. Tables, photographs. 20 ref. (To be continued.)

12391* Modern Welding Electrodes. **Zeitgemässe Schweisselektroden.** (German.) W. Hummitzsch. *Schweisstechnik*, v. 9, no. 3, Mar. 1955, p. 26-28.

Comparison of properties and economic efficiencies of principle types. Tables, graphs.

12392* Welding Electrodes for Joining Unalloyed and Low-Alloyed Steels. **Schweisselektroden für Schweissverbindungen unlegierter und niedriglegierter Stähle.** (German.) Alfred Schmidt. *Schweisstechnik*, v. 9, no. 3, Mar. 1955, p. 28-31.

Classification, description, and specifications according to new German standards; composition and properties of Austrian electrodes. Tables.

12393* Problems of Soldering Techniques. **Probleme der Löttechnik.** (German.) J. Colbus. *Schweisstechnik*, v. 9, no. 3, Mar. 1955, p. 31-35.

Effect of temperature, time, and flux on the diffusion of Ag into sheet Cu. Diagrams, micrographs, table.

12394* Welding Electrodes for Welding Unalloyed and Low-Alloyed Steels. **Schweisselektroden für Schweissverbindungen unlegierter und niedriglegierter Stähle.** (German.) Alfred Schmidt. *Schweisstechnik*, v. 9, no. 4, Apr. 1955, p. 37-39.

Preparation of weld-test bars and composition of welding electrodes. Diagrams, tables.

12395* Problems of Soldering Techniques. **Probleme der Löttechnik.** (German.) J. Colbus. *Schweisstechnik*, v. 9, no. 4, Apr. 1955, p. 42-45.

Effect of width of soldered joint, fracture resistance of base material and solder, metallurgical changes from soldering, and solder-base material bond on the mechanical properties of soldered joint. Graphs, table. 30 ref.

12396 Added Life for Brazing Fixtures. Charles Emery and Paul Goetcheus. *Steel*, v. 136, June 27, 1955, p. 82-83.

Lasting quality comes from the right alloys and good design. Photographs.

12397* Carbon and Silicon Alloying of the Low-Carbon Steel in Electrodes for Welding of Cast Iron. **Legirovanie uglerodom i kremniem malouglerodistoi stali v elektrodakh dlia svarki chuguna.** (Russian.) A. N. Shashkov. *Svarochnoe Proizvodstvo*, 1955, no. 6, June, p. 1-5.

Calculations of thickness and composition of alloying layer of coating; rates of solution retarding, and other factors, in relation to flux-shielded metal-arc welding. Graphs, diagrams, phase diagram. 8 ref.

12398* Effect of Flowability of Welding Bath on the Geometrical Form of the Welded Seam and on the Technological Applicability of the Welding Process. **Vliianie zhidkotekuchesti vanny na geometricheskuiu formu svarnogo shva i tekhnologicheskuiu primenimost' protsessa svarki.** (Russian.) A. A. Erokhin. *Svarochnoe Proizvodstvo*, 1955, no. 6, June, p. 5-9.

Relation of flowability to current, arc voltage, and rate of welding for different electrodes. Effect of fluxes. Graphs, tables, diagrams, micrograph. 5 ref.

12399* Electrodes for Welding and Cutting Metal Under Water. **Elektrody dlia svarki i rezki metalla v vode.** (Russian.) T. I. Avilov. *Svarochnoe Proizvodstvo*, 1955, no. 6, June, p. 9-10.

Proportion of gases (H_2, CO, CO_2) in which arc burns; gas pressure and other factors. Strength and microstructure of welds with respect to compositions of electrodes used. Oxygen cutting. Graphs, tables, micrograph.

12400* Flux-Shielded Metal-Arc Welding of Open-Hearth Furnace Framework Strutting. **Elektroshlakovaia svarka stoek karkasov martenovskikh pechei.** (Russian.) D. P. Lebed' and I. S. Miroshnichenko. *Svarochnoe Proizvodstvo*, 1955, no. 6, June, p. 11-13.

Parameters for welding procedure, including current strength, feed of electrode wire, depth of flux bath, etc. Chemical composition and mechanical properties of base metal, electrodes, and welds. Tables, diagram, micrographs. 4 ref.

12401* Gas Welding of Brass-L62. **Gazovaia svarka latuni L62.** (Russian.) G. A. Asinovskaia. *Svarochnoe Proizvodstvo*, 1955, no. 6, June, p. 15-18.

Micro-structural changes in weld and base metal; mechanical properties of weld. Diagram, photographs, micrographs, tables, graphs. 4 ref.

12402* Arc Welding of Brass. **Dugovaia svarka latuni.** (Russian.) M. M. Bort. *Svarochnoe Proizvodstvo*, 1955, no. 6, June, p. 18-21.

Mechanical properties and micro-structure of specimens arc-welded, with and without heat treatment; chemical composition of base metal and welded-on metal; welding procedures; comparison with gas-welding results. Tables, micrographs, photographs.

12403 Arc Welding for Small-Lot Production. II. Equipment and Processes. Arthur H. Allen. *Tool Engineer*, v. 35, July 1955, p. 83-87.

Selection of manual or automatic processes. Photographs, tables.

12404 Method for Determining Correct Amount of Silver Alloy Brazing Wire. Reference Sheet. *Tool Engineer*, v. 35, July 1955, p. 119-120, 123.

Wire selection for max. joint strength and optimum use of materials. Diagrams, nomograph.

12405* Tape Control of High Production Riveting. Thomas H. Speller. *Tooling and Production*, v. 21, June 1955, p. 83-86.

Includes diagrams, photographs.

12406 How to Use Semiautomatic Submerged Arc Welding. R. A. Wilson. *Welding Journal*, v. 34, June 1955, p. 535-541.

Advantages of the process when used where semiautomatic welding is applicable. Speeds four times greater than conventional hand welding are possible. Photographs, graphs, diagrams.

12407 Design and Application of Edge-Ring Projection Welding. Chester A. Czohara. *Welding Journal*, v. 34, June 1955, p. 551-558.

International Harvester applies resistance welding process in the manufacture of spring brackets. Photographs, diagrams, micrograph, tables.

12408 Inert Gas Welding of Stator Packs. F. J. Pilia. *Welding Journal*, v. 34, June 1955, p. 559-567.

Requirements for welding, factors influencing and controlling costs, and machine design suggestions for stator pack welding. Photographs, diagrams, nomograms.

12409 Oxy-Acetylene Flame Keeps Heavy Equipment in Top Shape. J. Dean Davidson. *Welding Journal*, v. 34, June 1955, p. 574, 576, 578.

Oxy-acetylene heating, welding, and cutting have a great part in lowering the repair and operating costs of heavy equipment. Photographs.

12410 Some Welding Research Problems. *Welding Journal*, v. 34, June 1955, p. 265S-269S.

A compilation to provide university research workers with a list of current welding research problems and to provide project committees with suggestions as to the needs in industry. 4 ref.

12411 A Mathematical Analysis of the Temperature Distribution During Flash Welding. E. F. Nippes, W. F. Savage, H. Suzuki, and W. H. Chang. *Welding Journal*, v. 34, June 1955, p. 271S-285S.

Proposed methods for choosing an adequate mean value of thermal diffusivity for a given material and for evaluating the amount of critical burn-off necessary to establish the stabilized temperature distribution. Graphs, diagrams, tables. 6 ref.

12412 The Effects of Alloying Elements on Welds in Titanium. II. G. E. Faulkner. *Welding Journal*, v. 34, June 1955, p. 295S-312S.

Experimental alloys which contained individual and combined additions of most of the commercially important Ti alloying elements were welded and tested. These tests were designed to show how the alloying elements affected the properties of welded joints in the experimental alloys. Alloying elements studied in the investigation were Al, Cr, Fe, Mn, Mo, and V. Photographs.

12413 Aluminium in Norwegian Shipbuilding. *Welding and Metal Fabrication*, v. 23, June 1955, p. 211-216.

Problems and procedures in metal-arc welding. Photographs, tables.

12414 Sigma Welding in Ship Construction. D. B. Tait. *Welding and Metal Fabrication*, v. 23, June 1955, p. 221-223.

Automatic assembly of light alloy structures. Welding equipment and procedures.

12415 Repair of Thermoplastic Cable Jackets Using Hot Gas Welding. Ross A. Pringle and Andrew D. Varenelli. *Wire and Wire Products*, v. 30, June 1955, p. 678-680, 712-713.

Repair of defects that occur during the manufacturing process. Photographs, graphs. 4 ref.

12416* Hard Soldering Metals That Are Difficult to Solder. Das Hartlöten schwer lötbarer Metalle. (German.) A. Schwarz. *VDI Zeitschrift*, v. 97, no. 13, May 1, 1955, p. 379-380.

Suggestions on the soldering of Al-bronze, Be-Cu, stainless Ni-Cr and Cr steels, Cr carbides, Mo, Ti, Zr, Ta, and Al to Cu joints.

12417* Studies on the Bonding of Metals. Studien zum Metallkleben. (German.) Hermann Winter. *Zeitschrift für Flugwissenschaften*, v. 3, nos. 3-4, Mar.-Apr. 1955, p. 87-94.

Experiments on the bonding of metals with "Redux" and "Araldit". The results of static and dynamic tests are given. Diagrams, graphs.

See also:

11079 (welding electrode coatings)
11362 (failures of steel welds)
11962 (pipeline welding)
11968 (behavior of steel in welded structures)
11969 (strength of welded structures)
12170 (weld quality)

WOOD AND FOREST PRODUCTS

12418* Forest Products and the Business of Tree Farming. Clark C. Heritage. *Chemurgic Digest*, v. 14, May 1955, p. 11-12.

Describes the successful tree farm of a large timber company in the state of Washington.

12419* Modern Trends in Layout and Design of Pulp and Paper Mills. A. M. Hurter. *Engineering Journal*, v. 38, June 1955, p. 763-778.

Includes photographs, diagrams.

12420* Pulpwood From Small Sawmill and Logging Residues: Problems and Opportunities. A. S. Todd, Jr. *Journal of Forestry*, v. 53, June 1955, p. 416-419.

Survey of residues; accessibility; competing uses; salvage problems and methods. Tables, photographs.

12421* Waste in the Woodworking Industry. Jäte mekaanisessa puunjalostusteollisuudessa. (Finnish.) V. J. Rinne. *Paperi ja Puu*, v. 37, no. 4a, Apr. 1955, p. 110-112.

Ways of minimizing losses. Tables.

12422* On the Structural Applications of Plywood. Vaneri rakenneaineena. (Finnish.) Erkki Niskanen. *Paperi ja Puu*, v. 37, no. 4a, Apr. 1955, p. 113-121.

Strength properties of plywood are briefly described and some numerical data are given on tension, compression, bending, and shear strengths. Tables, diagrams. 3 ref.

12423* The Determination of the Shear Strength of Plywood. Vanerin liimauslujuuden määrääminen. (Finnish.) Bror Sorsa. *Paperi ja Puu*, v. 37, no. 4a, Apr. 1955, p. 123-126.

Factors affecting the results of plywood shear tests. Photographs, graph, tables, diagrams.